Citrix XenServer ® 5.6 Virtual Machine Installation Guide

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About this document

Overview

This document is a guide to creating Virtual Machines with XenServer™, the platform virtualization solution from Citrix®. It describes the various methods of getting VMs up and running on XenServer hosts for each of the supported operating systems.

This section summarizes the rest of the guide so that you can find the information you need. The following topics are covered:

- General information about creating VMs
- Creating Windows VMs
- Creating Linux VMs
- Updating VMs
- Creating and using ISO images of vendor media for installing VMs
- Setting up a network repository of vendor media for installing VMs
- Troubleshooting problems with VMs

How this Guide relates to other documentation

This document is primarily aimed at system administrators who need to set up deployments of XenServer VMs. Other documentation shipped with this release includes:

- *XenServer Installation Guide* provides step-by-step instructions on installing XenServer hosts and the XenCenter management console;
- *XenServer Administrator's Guide* describes the tasks involved in configuring a XenServer deployment -- how to set up storage, networking and resource pools, and how to administer XenServer hosts using the xe command line interface (CLI).
- *XenServer Software Development Kit Guide* presents an overview of the XenServer SDK -- a selection of code samples that demonstrate how to write applications that interface with XenServer hosts.
- *XenAPI Specification* provides a programmer's reference guide to the XenServer API.
- *Release notes* provide a list of known issues that affect this release.

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Creating VMs

This chapter provides an overview of how VMs are created and lists virtual memory and virtual disk size minimums, describes the differences in virtual device support for the members of the XenServer product family. This chapter also discusses physical to virtual conversion (P2V), cloning templates, and importing previously-exported VMs.

Overview

VMs are created from *templates*. A template is a "gold image" that contains all the various configuration settings to instantiate a specific VM. XenServer ships with a base set of templates, which range from generic "raw" VMs that can boot an OS vendor installation CD or run an installation from a network repository to complete pre-configured OS instances.

Different operating systems require slightly different settings in order to run at their best. XenServer templates are tuned to maximize operating system performance.

The Linux templates create Pure Virtual (PV) guests, as opposed to the HVM guests created by the Windows and Other Install Media templates. Other Install Media template Linux installations are not supported.

There are three basic methods by which VMs are created using templates:

- using a complete pre-configured template.
- Installing from a CD or an *ISO image* onto the appropriate template.
- Installing from vendor media on a network installation server directly onto a template.

See *Installing Linux VMs* to find out which methods are supported for which Linux flavor operating systems. Windows VMs can be installed from a CD or an ISO image.

Creating VMs by installing Windows operating systems onto the appropriate templates is described in *Installing Windows VMs*.

Creating VMs by installing Linux operating systems onto the appropriate templates is described in *Installing Linux VMs*.

Additionally, VMs can be created by:

- using the physical-to-virtual (P2V) and virtual-to-virtual (V2V) conversion tool XenConvert
- importing an existing, exported VM
- converting an existing VM to a template

These methods are described in this chapter.

Virtual memory and disk size limits

In general, when installing VMs, be sure to follow the memory and disk space guidelines of the operating system and any relevant applications that you want to run when allocating resources such as memory and disk space.

Note that individual versions of the operating systems may also impose their own maximum limits on the amount of memory supported (for example, for licensing reasons).

Warning:

When configuring guest memory, please be careful not to exceed the maximum amount of physical memory addressable by your operating system. Setting a memory maximum that's greater than the operating system supported limit may lead to stability problems within your guest.

Operating System	Minimum RAM	Maximum RAM	Disk space
Windows 7 32-bit	1GB	4GB	Minimum 16GB, 40GB or more recommended
Windows 7 64-bit	2GB	32GB	Minimum 20GB
Windows Server 2008 R2	512MB	32GB	Minimum 32GB
Windows Server 2008 32-bit/64-bit	512MB	32GB	Minimum 10GB, 40GB or more recommended
Windows Vista 32-bit	1GB	4GB	16GB
Windows Server 2003	256MB	32GB	2GB
Windows XP SP2/3	256MB	32GB	1.5GB
Windows 2000 SP4	256MB	32GB	2GB
CentOS 4.5, 4.6, 4.7	256MB	16GB	800MB
CentOS 5.0, 5.1, 5.2, 5.3, 5.4	512MB	16GB	800MB
Red Hat Enterprise Linux 4.5, 4.6, 4.7, 4.8	256MB	16GB	800MB
Red Hat Enterprise Linux 5.0, 5.1, 5.2, 5.3, 5.4	512MB	16GB	800MB
SUSE Linux Enterprise Server 9 SP2/3/4	256MB	32GB	1GB
SUSE Linux Enterprise Server 10 SP1/2, 11	512MB	32GB	1.5GB
Oracle Enterprise Linux 5.0, 5.1, 5.2, 5.3, 5.4	512MB	16GB	800MB
Debian Lenny	128MB	32GB	4GB

Note:

Some 32-bit Windows operating systems can support more than 4 GB of RAM through the use of a special mode - physical address extension (PAE) mode. Administrators wishing to reconfigure a VM with greater

than 4 GB of RAM must use the xe CLI, and not XenCenter, as the CLI does not impose any upper bounds for `memory-static-max`. For more information on how to set the memory static max, please refer to the Dynamic Memory Control chapter, in the XenServer Administrator's Guide.

XenServer product family virtual device support

The current version of the XenServer product family has the following general limitations on virtual devices for VMs. Note that specific guest operating systems may have lower limits for certain features. These limitations are noted in the individual guest installation section.

Virtual device	Linux VMs	Windows VMs
Number of virtual CPUs	32*	8
Number of virtual disks	7 (including virtual CD-ROM)	7 (including virtual CD-ROM)
Number of virtual CD-ROM drives	1	1
Number of virtual NICs	7†	7

*A maximum of 8 VCPUs are supported by XenCenter.

†except for SLES 10 SP1 and RHEL 4.x, which support 3. RHEL 5.0/5.1/5.2 support 3, but can support 7 when the kernel is patched with the Citrix Tools for Virtual Machines. The same applies for Oracle and CentOS 5.0/5.1/5.2

Physical to Virtual Conversion (P2V)

Physical to Virtual Conversion(P2V) is the process by which an existing Windows operating system on a physical server -- its filesystem, configuration, and so on -- is turned into a virtualized instance of the same operating system and filesystem, transferred, instantiated, and started as a VM on the XenServer host.

For existing physical instances of Windows servers, use XenConvert. XenConvert runs on the physical Windows machine and converts it live into a VHD-format disk image or an XVA template suitable for importing into a XenServer host. The physical host does not need to be restarted during this process, and device drivers are automatically modified to make them able to run in a virtual environment. For more information, please refer to the XenConvert documentation for installation and usage guidelines.

Cloning an existing VM

You can make a copy of an existing VM by *cloning* from a template. Templates are ordinary VMs which are intended to be used as master copies to instantiate VMs from. A VM can be customized and converted into a template, but be sure to follow the appropriate preparation procedure for the VM (see the section called “Preparing to clone a Windows VM” for Windows and the section called “Preparing to clone a Linux VM” for Linux). Templates cannot be used as normal VMs.

XenServer has two mechanisms for cloning VMs: a full copy, or a faster Copy-on-Write (CoW) mode which only writes modified blocks to disk. The CoW mode is only supported for file-backed VMs. CoW is designed to save disk space and allow fast clones, but will slightly slow down normal disk performance. A template can be fast-cloned multiple times without slowdown, but if a template is cloned into a VM and the clone converted back into a template, disk performance can linearly decrease depending on the number of times this has happened. In this event, the **vm-copy** CLI command can be used to perform a full copy of the disks and restore expected levels of disk performance.

Resource pools introduce some complexities around creating custom templates and cloning them. If you create a template on a server in a pool, and all virtual disks of the source VM are on shared storage

repositories, the operation of cloning that template will be forwarded to any server in the pool that can see those shared SRs. However, if you create the template from a source VM that has any virtual disks on a local SR, then the clone operation can only execute on the server that can access that SR.

Importing an exported VM

You can create a VM by *importing* an existing exported VM. Like cloning, exporting and importing a VM is way to create additional VMs of a certain configuration. You might, for example, have a special-purpose server configuration that you use many times. Once you have set up a VM the way you want it, you can export it, and import it later to create another copy of your specially-configured VM. You can also use export and import to move a VM to a XenServer host that in another resource pool.

When importing a VM, you can choose to preserve the MAC address on any virtual network interfaces associated with it. If you choose to generate a new MAC address, be sure to follow the appropriate preparation procedure for the imported VM. See the section called “Preparing to clone a Windows VM” for Windows and the section called “Preparing to clone a Linux VM” for Linux.

Importing an exported VM may take some time, depending on the size of the VM and the speed and bandwidth of the network connection between the XenServer host and XenCenter.

When VMs are imported XenServer re-attaches the VM VIFs to any network that has the same name as the network on the server that the VM was exported from. If no matching network can be found a new private network is created and the VM VIFs are attached to that.

Exporting a VM

An existing VM can be exported using XenCenter or the CLI. This section describes using the CLI. For details on exporting using XenCenter, see the XenCenter online Help.

The following procedure assumes that you have multiple XenServer hosts and that you are administering them using the CLI on a separate machine (that is, a machine that is not one of the XenServer hosts) where you can maintain a library of export files. Citrix recommends not exporting a VM to a XenServer host filesystem.

To export a VM using the CLI

1. Shut down the VM that you want to export.
2. Export the VM:

```
xe vm-export -h <hostname> -u <root> -pw <password> vm=<vm_name> \
filename=<pathname_of_file>
```

Note:

Be sure to include the `.xva` extension when specifying the export filename. If the exported VM does not have this extension and you attempt to import it using XenCenter, it might fail to recognize the file as a valid XVA file.

3. The export process might take some time to complete. When finished, the command prompt returns.

Importing a VM

An exported VM file can be imported using XenCenter or the CLI. This section describes using the CLI. For details on importing using XenCenter, see the XenCenter online Help.

The following procedure assumes that you are administering the XenServer host using the CLI on a separate machine (that is, a machine that is not one of your XenServer hosts) where you maintain a library of export files.

To import a VM using the CLI

1. To import the VM to the default SR on the target XenServer host:

   ```
   xe vm-import -h <hostname> -u <root> -pw <password> \
   filename=<pathname_of_export_file>
   ```

   You can import the VM to another SR on the target XenServer host by adding the optional *sr-uuid* parameter:

   ```
   xe vm-import -h <hostname> -u <root> -pw <password> \
   filename=<pathname_of_export_file> sr-uuid=<uuid_of_target_sr>
   ```

   You can also preserve the MAC address of the original VM by adding the optional *preserve* parameter set to *true*:

   ```
   xe vm-import -h <hostname> -u <root> -pw <password> \
   filename=<pathname_of_export_file> preserve=true
   ```

2. The import process might take some time to complete. When finished, the command prompt returns the UUID of the newly-imported VM.

VM Block Devices

In the para-virtualized (PV) Linux case, block devices are passed through as PV devices. XenServer does not attempt to emulate SCSI or IDE, but instead provides a more suitable interface in the virtual environment in the form of `xvd*` devices. It is also sometimes possible (depending on the OS) to get an `sd*` device using the same mechanism, where the PV driver inside the VM takes over the SCSI device namespace. This is not desirable so it is best to use `xvd*` where possible for PV guests (this is the default for Debian and RHEL).

For Windows or other fully virtualized guests, XenServer emulates an IDE bus in the form of an `hd*` device. When using Windows, installing the Citrix Tools for Virtual Machines installs a special PV driver that works in a similar way to Linux, except in a fully virtualized environment.

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Installing Windows VMs

XenServer allows you to install Windows 2000 SP4, Windows Server 2003 (32-/64- bit), Windows Server 2008, Windows XP SP2/3, Windows Vista and Windows 7 as a VM. Installing Windows VMs on a XenServer host requires hardware virtualization support (Intel VT or AMD-V).

The process of installing a Windows VM can be broken down into two main steps:

- installing the Windows operating system
- installing the *paravirtualized device drivers* known as the Citrix Tools for Virtual Machines

Windows VMs are installed by cloning an appropriate template using either XenCenter or the CLI. The templates for individual guests have predefined platform flags set which define the configuration of the virtual hardware. For example, all Windows VMs are installed with the ACPI Hardware Abstraction Layer (HAL) mode enabled. If you subsequently change one of these VMs to have multiple virtual CPUs, Windows automatically switches the HAL to multi-processor mode.

The available Windows templates are:

- **Windows Server 2008 (x86), optimized for Citrix XenApp**
  can be used to install all editions of Windows Server 2008 (x86). This template is specially tuned to optimize XenApp performance.
- **Windows Server 2008 (x64), optimized for Citrix XenApp**
  can be used to install all editions of Windows Server 2008 (x64). This template is specially tuned to optimize XenApp performance.
- **Windows Server 2008 R2 (x64), optimized for Citrix XenApp**
  can be used to install all editions of Windows Server 2008 R2 64-bit. This template is specially tuned to optimize XenApp performance.
- **Windows Server 2003 (x86), optimized for Citrix XenApp**
  can be used to install Windows Server 2003 32-bit SP0, SP1, SP2, and R2. The Server, Enterprise, Data Centre, and SBS editions are supported. This template is specially tuned to optimize XenApp performance.
- **Windows Server 2003 (x64), optimized for Citrix XenApp**
  can be used to install Windows Server 2003 64-bit. The Server, Enterprise, Data Centre, and SBS editions are supported. This template is specially tuned to optimize XenApp performance.
- **Windows Server 2008**
  can be used to install Windows Server 2008 32-bit.
- **Windows Server 2008 x64**
  can be used to install Windows Server 2008 64-bit.
- **Windows Server 2008 R2 x64**
  can be used to install Windows Server 2008 R2, 64-bit.
- **Windows Server 2003**
  can be used to install Windows Server 2003 32-bit SP0, SP1, SP2, and R2. The Server, Enterprise, Data Centre, and SBS editions are supported.
- **Windows Server 2003 x64**
  can be used to install Windows Server 2003 64-bit. The Server, Enterprise, Data Centre, and SBS editions are supported.
- **Windows 2000 SP4 (x86)**
  can be used to install Windows 2000 Server SP 4, 32-bit. Earlier service packs are not supported.

- **Windows 7 (x86)**
  can be used to install Windows 7, 32-bit.
- **Windows 7 (x64)**
  can be used to install Windows 7, 64-bit.
- **Windows Vista (x86)**
  can be used to install Windows Vista 32-bit. The *Enterprise* edition is supported.
- **Windows XP SP3 (x86)**
  can be used to install Windows XP Service Pack 3, 32-bit. Earlier service packs are not supported.
- **Windows XP SP2 (x86)**
  can be used to install Windows XP Service Pack 2, 32-bit. Earlier service packs are not supported.

The Windows VM can be installed either from an install CD in a physical CD-ROM drive on the XenServer host, or from an ISO image of your Windows media. See Appendix A, *Creating ISO images* for information on how to make an ISO image from a Windows install CD and make it available for use.

Making the ISO available to XenServer hosts

To make an ISO library available to XenServer hosts, create an external NFS or SMB/CIFS share directory. The NFS or SMB/CIFS server must allow root access to the share. For NFS shares, this is accomplished by setting the *no_root_squash* flag when you create the share entry in `/etc/exports` on the NFS server.

Then either use XenCenter to attach the ISO library, or connect to the host console and run the command:

```
xe-mount-iso-sr host:/volume
```

Additional arguments to the mount command may be passed in, for advanced use.

If making a Windows SMB/CIFS share available to the XenServer host, either use XenCenter to make it available, or connect to the host console and run the command:

```
xe-mount-iso-sr unc_path -t smbfs -o username=myname/myworkgroup
```

The *unc_path* argument should have back-slashes replaces by forward-slashes. *-t cifs* can be used for CIFS instead of SMB. Examples:

```
xe-mount-iso-sr //server1/myisos -t cifs -o username=johndoe/mydomain
xe-mount-iso-sr //server2/iso_share -t smbfs -o username=alice
```

After mounting the share, any ISOs in it should be available by name from the CD pulldown list in XenCenter, or as CD images from the CLI commands. The ISO should be attached to an appropriate Windows template.

Copying ISOs to local storage

In XenServer 3.2 and earlier, ISOs could be copied directly to the control domain into the `/opt/xensource/packages/iso` directory. In XenServer 5.6 hosts, this directory is reserved for use of the built-in ISO images, and is *not intended for general use*. This directory is considered to be identical across hosts in a resource pool, and CD images may fail to attach if the contents are modified.

To use local ISO storage from the control domain

1. Log onto the host console.
2. Create a directory to copy the local ISOs into:

   ```
   mkdir -p /var/opt/xen/iso_import
   ```
3. Create an ISO storage repository:

```
xe sr-create name-label=<name> type=iso \
device-config:location=/var/opt/xen/iso_import/<name> \
device-config:legacy_mode=true content-type=iso
```

4. Copy the ISO images into this directory, taking care not to fill up the control domain filesystem.
5. Verify that the ISO image is available for use by using the **xe vdi-list** command, or by checking in XenCenter.

Warning:

Be extremely careful with copying ISOs directly onto the control domain filesystem, as it has limited space available. A network share is a much safer mechanism for storing large numbers of ISO images. If the control domain does fill up, unpredictable behavior will result.

Windows PV drivers

The Citrix paravirtualized network and SCSI drivers (Citrix Tools for Virtual Machines) provide high performance I/O services without the overhead of traditional device emulation. During the installation of a Windows operating system, XenServer uses traditional device emulation to present a standard IDE controller and a standard network card to the VM. This allows Windows to complete its installation using built-in drivers, but with reduced performance due to the overhead inherent in emulation of the controller drivers.

After Windows is installed, install the Citrix high-speed PV drivers. These are on an ISO available to the virtual CD-ROM drive of the Virtual Machine. These drivers replace the emulated devices and provide high-speed transport between Windows and the XenServer product family software.

Note:

While a Windows VM functions without them, performance is significantly hampered unless these drivers are installed. Running Windows VMs without these drivers is *not* supported. Some features, such as live relocation across physical hosts, will only work with the PV drivers installed and active.

Attach the Windows PV drivers ISO to the VM by using the **Install Tools** menu in XenCenter, or by directly attaching the built-in `xs-tools.iso` ISO image on the VM using the CLI. Once the ISO is attached, double-click on the `xensetup.exe` installer executable and follow the on-screen prompts.

Note:

To silently install the Citrix Tools for Virtual Machines and prevent the system from rebooting afterwards, use the `/S` and `/norestart` options:

```
<install_dir>/xensetup.exe /S /norestart
```

The Windows PV drivers are installed by default in the `C:\Program Files\Citrix\XenTools` directory on the VM.

The Citrix Tools for Virtual Machines can also be installed on a provisioned Windows machine by running the executable `windows-pvdrivers-xensetup.exe`, located in the `client_install/` directory of the installation CD.

Windows Volume Shadow Copy Service (VSS) provider

The Windows tools also include a XenServer VSS provider that is used to quiesce the guest filesystem in preparation for a VM snapshot. The VSS provider is installed as part of the PV driver installation, but is not enabled by default.

To enable the Windows XenServer VSS provider

1. Install the Windows PV drivers.
2. Navigate to the directory where the drivers are installed (by default `c:\Program Files\Citrix\XenTools`, or the value of *`HKEY_LOCAL_MACHINE\Software\Citrix\XenTools\Install_dir`* in the Windows Registry).
3. Double-click the `install-XenProvider.cmd` command to activate the VSS provider.

   Note:

   The VSS provider is automatically uninstalled when the PV drivers are uninstalled, and need to be activated again upon reinstallation. They can be uninstalled separately from the PV drivers by using `uninstall-XenProvider.cmd` in the same directory.

Remote Desktop

The graphical console for Windows can be either a standard console using an emulated graphics card, or an RDP connection.

For Windows VMs, there is a **Switch to Remote Desktop** button on the **Console** tab in XenCenter. Clicking it disables the standard graphical console, and switches to using Remote Desktop instead.

The button will be disabled if you do not have Remote Desktop enabled in the VM. To enable it, install the PV drivers and follow the procedure to enable Remote Desktop:

To enable Remote Desktop on a Windows VM

1. From the **Start** menu, select **Control Panel**.
2. From the **Control Panel** window, select **System**.
3. In the **System Properties** dialog box, select the **Remote** tab.
4. In the **Remote Desktop** section of this dialog box, check the check box labeled **Allow users to connect remotely to this computer** (Windows XP) or **Enable Remote Desktop on this computer** (Windows 2003 Server).
5. If you want to select any non-administrator users that can connect to this Windows VM, click the **Select Remote Users...** button and provide the usernames. Users with Administrator privileges on the Windows domain can connect by default.

Preparing to clone a Windows VM

Use the Windows utility **sysprep** to prepare a Windows VM for cloning. This is the only supported way to clone a Windows VM.

Computers running Windows operating systems are uniquely identified by a Security ID (SID). When cloning a Windows VM, it is important to take steps to ensure the uniqueness of the SID. Cloning an installation without taking the recommended system preparation steps can lead to duplicate SIDs and other problems. Because the SID identifies the computer or domain as well as the user, it is critical that it is unique. Refer to the Microsoft KnowledgeBase article 162001, "Do not disk duplicate installed versions of Windows," for more information.

sysprep modifies the local computer SID to make it unique to each computer. The **sysprep** binaries are on the Windows product CDs in the `\support\tools\deploy.cab` file.

The steps that you need to take to clone Windows VMs are:

Cloning Windows VMs

1. Create, install, and configure the Windows VM as desired.
2. Apply all relevant Service Packs and updates.
3. Install the Citrix Tools for Virtual Machines.
4. Install any applications and perform any other configuration.
5. Copy the contents of `\support\tools\deploy.cab` from the Windows product CD to a new `\sysprep` folder in the VM.
6. Run **sysprep**. This will shut down the VM when it completes.
7. Using XenCenter convert the VM into a template.
8. Clone the newly created template into new VMs as required.
9. When the cloned VM starts, it will get a new SID and name, run a mini-setup to prompt for configuration values as necessary, and finally restart, before being available for use.

Note:

The original, sysprepped VM (the "source" VM) should *not* be restarted again after the **sysprep** stage, and should be converted to a template immediately afterwards to prevent this. If the source VM is restarted, **sysprep** must be run on it again before it can be safely used to make additional clones.

For more information on using **sysprep**, refer to the Microsoft TechNet page Windows System Preparation Tool.

Time Handling in Windows VMs

For Windows guests, time is initially driven from the control domain clock, and is updated during VM lifecycle operations such as suspend, reboot and so on. Citrix highly recommends running a reliable NTP service in the control domain and all Windows VMs.

So if you manually set a VM to be 2 hours ahead of the control domain (e.g. using a time-zone offset within the VM), then it will remember that. If you subsequently change the control domain time (either manually or if it is automatically corrected by NTP), the VM will shift accordingly but maintain the 2 hour offset. Note that changing the control domain time-zone does not affect VM time-zones or offset. It is only the hardware clock setting which is used by XenServer to synchronize the guests.

When performing suspend/resume operations or live relocation using XenMotion, it is important to have up-to-date Windows PV drivers installed, as they notify the Windows kernel that a time synchronization is required after resuming (potentially on a different physical host).

Installing a VM from Reseller Option Kit (BIOS-locked) Media

To allow installation of Reseller Option Kit (BIOS-locked) OEM versions of Windows, onto a VM running on a XenServer host, the BIOS strings of the VM will need to be copied from the host with which the ROK media was supplied.

In order to install the BIOS-locked media that came with your host, you will need to follow the steps below:

Installing a BIOS-locked VM

1. Run the `vm-install copy-bios-strings-from` command and specify the host-uuid as the host from which the strings should be copied (i.e. the host that the media was supplied with):

```
xe vm-install copy-bios-strings-from=<host uuid> \
  template=<template name> sr-name-label=<name of sr> \
  new-name-label=<name for new VM>
```

This returns the UUID of the newly created VM.

For example:

```
xe vm-install copy-bios-strings-from=46dd2d13-5aee-40b8-ae2c-95786ef4 \
  template="CentOS 5.3" sr-name-label=Local\ storage  \
  new-name-label=newcentos
7cd98710-bf56-2045-48b7-e4ae219799db
```

2. If the relevant BIOS strings from the host have been successfully copied into the VM, the command `vm-is-bios-customized` will confirm this:

```
xe vm-is-bios-customized uuid=<VM uuid>
```

For example:

```
xe vm-is-bios-customized \
  uuid=7cd98710-bf56-2045-48b7-e4ae219799db
This VM is BIOS-customized.
```

Note:

When you start the VM, it will be started on the physical host from which you copied the BIOS strings.

A VM can be

- BIOS-generic: the VM has generic XenServer BIOS strings;
- BIOS-customized: the VM has a copy of the BIOS strings of a particular host in the pool;
- without BIOS strings: immediately after its creation.

Warning:

It is your responsibility to comply with any EULAs governing the use of any BIOS-locked operating systems that you install.

Release Notes

There are many versions and variations of Windows with different levels of support for the features provided by XenServer. This section lists notes and errata for the known differences.

General Windows Issues

- When installing Windows VMs, start off with no more than three virtual disks. Once the VM and Citrix Tools for Virtual Machines tools have been installed you can add additional virtual disks. The boot device should always be one of the initial disks so that the VM can successfully boot without the Citrix Tools for Virtual Machines.
- Multiple VCPUs are exposed as CPU sockets to Windows guests, and are subject to the licensing limitations present in the VM. The number of CPUs present in the guest can be confirmed by checking Device Manager. The number of CPUs actually being used by Windows can be seen in the Task Manager.
- The disk enumeration order in a Windows guest may differ from the order in which they were initially added. This is because of interaction between the PV drivers and the PnP subsystem in Windows. For

example, the first disk may show up as `Disk 1`, the next disk hotplugged as `Disk 0`, a subsequent disk as `Disk 2`, and then upwards in the expected fashion.

- There is a bug in the VLC player DirectX backend that causes yellow to be replaced by blue when playing video if the Windows display properties are set to 24-bit color. VLC using OpenGL as a backend works correctly, and any other DirectX- or OpenGL-based video player works too. It is not a problem if the guest is set to use 16-bit color rather than 24.
- The PV Ethernet Adapter reports a speed of 2 Gbps in Windows VMs. This speed is a hardcoded value and is not relevant in a virtual environment because the virtual NIC is connected to a virtual switch. The NIC will actually perform at the same rate as the physical NIC.

Windows Server 2008

Quiesced snapshots taken on Windows Server 2008 guests will not be directly bootable. Attach the snapshot disk to an existing Windows Server 2008 VM to access files for restoration purposes.

Windows Server 2003

Windows Server 2003 32-bit does not boot successfully if any virtual disks larger than 2TB (terabytes) in size are attached to the VM. See this article in the Windows Hardware Developer Central website.

Windows 2000 Server

No known issues.

Windows 7

No known issues

Windows Vista

Microsoft Vista recommends a root disk of size 20GB or higher. The default size when installing this template is 24GB, which is 4GB greater than the minimum. Consider increasing this.

Windows XP SP3

Windows XP does not support disks larger than 2TB (terabytes) in size. See this article in the Windows Hardware Developer Central website.

CITRIX

Installing Linux VMs

This chapter discusses how to create Linux VMs, either by installing them or cloning them. This chapter also contains vendor-specific installation instructions and release notes.

When you want to create a new VM, you must create the VM using a template for the operating system you want to run on the VM. You can use a template Citrix provides for your operating system, or one that you created previously. You can create the VM from either XenCenter or the CLI.

For some operating systems, such as RHEL 4.5 to 4.8, you will also need to install a Citrix-provided kernel. Other operating systems, such as RHEL 5.x, require installing a specific version of a vendor provided kernel.

Installing a Linux VM requires using a process such as the following:

1. Create the VM for your target operating system using the New VM wizard or the CLI.
2. Install the operating system using vendor's installation media.
3. Install the correct kernel version, if applicable.
4. Install the Linux Guest Agent so that information about the VM appears in XenCenter and the CLI. See the section called “Installing the Linux guest agent”.
5. Setting the correct time and time zone on the VM. See the section called “Time handling in Linux VMs”.
6. Ensuring VNC is functioning correctly. See the section called “Configuring VNC for VMs”.

XenServer supports the installation of many Linux distributions as VMs. There are four installation mechanisms:

- complete distributions provided as built-in templates
- using the vendor media in the server's physical DVD/CD drive
- using the vendor media to perform a network installation
- installing from an ISO library

Installing Linux VMs requires the Linux Pack to be installed onto the XenServer host. Without the Linux Pack, the Linux VM templates are not available.

Warning:

If you have not installed the Linux Pack, and you are using XenCenter to install VMs, the **New VM** wizard will show only Windows choices in the list. Do not select **Other install media** to install a Linux VM. This will not work properly and is *not* supported.

The **Other install media** template is meant for advanced users who want to attempt to install VMs running unsupported operating systems. XenServer has been tested running only the supported distributions and specific versions covered by the standard supplied templates, and any VMs installed using the **Other install media** template are *not* supported.

The supported Linux distributions are:

Distribution	Vendor Install from CD	Vendor Install from network repository	Notes
Demo Linux VM			Built-in
Debian Lenny 5.0	X	X	

Distribution	Vendor Install from CD	Vendor Install from network repository	Notes
Red Hat Enterprise Linux 4.5, 4.6, 4.7, 4.8	X	X	Requires installing Citrix Tools for Virtual Machines after installing RHEL to apply the Citrix RHEL 4.8 kernel.
Red Hat Enterprise Linux 5.0, 5.1, 5.2, 5.3, 5.4 32-bit	X	X	Supported provided they use the 5.4 or later kernel.
Red Hat Enterprise Linux 5.0, 5.1, 5.2, 5.3, 5.4 64-bit	X	X	Supported provided they use the 5.4 or later kernel.
SUSE Linux Enterprise Server 9 SP4		X	
SUSE Linux Enterprise Server 10 SP1, SP2 32-bit/64-bit	X	X	
SUSE Linux Enterprise Server 10 SP3 32-bit			Supported only if upgrading from SLES 10 SP2
SUSE Linux Enterprise Server 10 SP3 64-bit	X	X	
SUSE Linux Enterprise Server 11 32-bit/64-bit	X	X	
CentOS 4.5, 4.6, 4.7, 4.8	X	X	
CentOS 5.0, 5.1, 5.2, 5.3, 5.4 32-bit	X	X	
CentOS5.0, 5.1, 5.2, 5.3, 5.4 64-bit	X	X	
Oracle Enterprise Linux 5.0, 5.1, 5.2, 5.3, 5.4 32-bit	X	X	
Oracle Enterprise Linux 5.0, 5.1, 5.2, 5.3, 5.4 64-bit	X	X	

Distributions not present in the above list are *not* supported. However, distributions that use the same installation mechanism as Red Hat Enterprise Linux 5 (for example Fedora Core 6) might be successfully installed using the same template.

Note:

Creating 32-bit Linux VMs on a host that has more than 128GB of memory is not supported.

Installing the Demo Linux VM template

The Demo Linux VM template provided with XenServer can be used to create a VM running Linux without the need for vendor installation media. This can be handy for testing purposes. For example, Demo Linux VMs

allow quick and simple VM creation for use with XenServer product features such as XenMotion, Dynamic Memory Control, and High Availability.

Warning:

Demo Linux VMs should not be used for running production workloads.

The VMs are instantiated by running the **vm-install** command on the CLI, or by cloning the template using XenCenter. For example, using the CLI on Linux:

```
xe vm-install template-name="Demo Linux VM"  new-name-label=<demo>
```

When you first boot the VM you are prompted for a root password, a VNC password (for graphical use), and a hostname. You will need to add a network interface if you installed the VM using the CLI.

Note:

The Demo Linux VM template is only available if you install the separate Linux pack (that is, the linux.iso).

Installing Debian Lenny

Debian Lenny is installed using the standard Debian installer, which supports installation into a PV VM (performance optimized). Use XenCenter or the xe CLI to install Debian Lenny either from a CD, ISO library, or from a network repository over FTP or HTTP.

Before installing Debian Lenny from a network repository, follow Debian's instructions for preparing for network installations, including how to set up a mirror. Full installations from network repositories are not completely supported. While you can load the kernel and RAM disk from repository, the Debian installation program requires that you specify an HTTP or FTP URL.

Information on installing Debian Lenny using XenCenter is available in the XenCenter help — to get started, run the **New VM** wizard. The rest of this section provides information about installing Debian Lenny using the CLI.

Note:

If you want to perform a Debian Lenny installation from the CD, you might find helpful tips in the "Debian Lenny" article on the Citrix Developer Network. See If you want to perform a Debian Lenny installation from the DVD, then you must obtain a suitable Debian Lenny DVD image that is compatible with XenServer. The standard images Debian provides are not compatible with XenServer. For details on how to obtain this DVD image, see the Debian Lenny article on the Citrix Developer Network (http://community.citrix.com/display/xs/Debian+Lenny .

Installing a Debian Lenny VM from a network repository (using the CLI)

1. Create a VM from the Debian Lenny template. The UUID of the VM is returned:

   ```
   xe vm-install template=Debian\ Lenny\ 5.0 new-name-label=<lenny-vm>
   ```

2. Specify the installation repository — this should be a standard Debian mirror with at least the packages required to install the base system and the additional packages you plan to select during the Debian installer:

   ```
   xe vm-param-set uuid=<UUID> other-config:install-repository=<path_to_repository>
   ```

   An example of a valid repository path is `http://ftp.<xx>debian.org/debian` where `<xx>` is your country code (see the Debian mirror list for a list of these). For multiple installations Citrix recommends

using a local mirror or apt proxy to avoid generating excessive network traffic or load on the central repositories.

3. Start the VM; it boots straight into the Debian installer:

   ```
   xe vm-start uuid=<UUID>
   ```

4. Follow the Debian Installer procedure to install the VM in the configuration you require.
5. See below for instructions on how to install the guest utilities and how to configure graphical display.

Installing a Debian Lenny VM from an ISO (using the CLI)

1. Create a VM from the Debian Lenny template. The UUID of the VM is returned:

   ```
   xe vm-install template=Debian\ Lenny\ 5.0 new-name-label=<lenny-vm>
   ```

2. Get the UUID of the root disk of the new VM:

   ```
   xe vbd-list vm-uuid=<vm_uuid> userdevice=0 params=uuid --minimal
   ```

3. Using the UUID returned, set the root disk to not be bootable:

   ```
   xe vbd-param-set uuid=<root_disk_uuid> bootable=false
   ```

4. Get the name of the physical CD drive on the XenServer host:

   ```
   xe cd-list
   ```

   The result of this command should give you something like SCSI 0:0:0:0 for the *name-label* field.

5. Add a virtual CD-ROM to the new VM using the XenServer host CD drive *name-label* parameter as the *cd-name* parameter:

   ```
   xe vm-cd-add vm=<vm_name> cd-name="<host_cd_drive_name_label>" device=3
   ```

6. Get the UUID of the VBD corresponding to the new virtual CD drive:

   ```
   xe vbd-list vm-uuid=<vm_uuid> type=CD params=uuid --minimal
   ```

7. Make the VBD of the virtual CD bootable:

   ```
   xe vbd-param-set uuid=<cd_drive_uuid> bootable=true
   ```

8. Set the install repository of the VM to be the CD drive:

   ```
   xe vm-param-set uuid=<vm_uuid> other-config:install-repository=cdrom
   ```

9. Insert the Debian Lenny installation CD into the CD drive on the XenServer host.
10. Open a console to the VM with XenCenter or an SSH terminal and follow the steps to perform the OS installation.
11. Start the VM; it boots straight into the Debian installer:

    ```
    xe vm-start uuid=<UUID>
    ```

12. See the sections that follow for instructions on how to install the guest utilities and how to configure graphical display.

Automated installation of Debian Lenny

Installation of Debian Lenny uses the standard Debian installer — you can use the usual Debian pre-seed mechanism to support automated installation.

1. Create a pre-seed file. Information about pre-seed files is available in the appendices of the Debian user guide.

2. Set the kernel command-line correctly for the VM before starting it. This can be done using XenCenter's New VM wizard or by executing an xe CLI command like the following:

```
xe vm-param-set uuid=<uuid> PV-args=<preseed_arguments>
```

Apt repositories and Lenny

For infrequent or one-off installations of Lenny, it is reasonable to directly use a Debian mirror. However, if you intend to do several VM installations, we recommend that you use a caching proxy or local mirror. Apt-cacher is an implementation of proxy server that will keep a local cache of packages. debmirror is a tool that will create a partial or full mirror of a Debian repository. Either of these tools can be installed into a VM.

Installing Red Hat, CentOS, Oracle Enterprise, and SUSE Enterprise Linux

This section provides an overview of installing Red Hat, CentOS, Oracle Enterprise, and SUSE Enterprise.

For information about the general Linux VM installation process, see *Installing Linux VMs*.

Installing RHEL 5.x/CentOS/OEL 5.x

When you want to create a RHEL 5.x/CentOS/OEL 5.x VM, you must ensure the operating system will use the RHEL 5.4 kernel (2.6.18-164.el5) or higher, which is available from the distribution vendor.

1. Create the VM using the New VM wizard or the CLI.
2. Install the RHEL operating system using vendor's installation media.
3. Upgrade to the 5.4 or later kernel using the vendor's normal kernel upgrade procedures.
4. Follow the process for installing the Linux Guest Agent, setting the time, and configuring the VNC. See the overview *Installing Linux VMs*.

   Note:

   Enterprise Linux (EL) kernel versions prior to 5.4 contain issues that prevent proper operation as a XenServer VM. In previous XenServer releases, Citrix provided a 5.x kernel with fixes for those issues and required its installation. Since the required fixes are now available in 5.4 (2.6.18-164.el5) and later kernels, Citrix no longer supplies a 5.x kernel. Instead, Citrix requires use of a 5.4 or later kernel.

Installing RHEL 4.5 to 4.8

When you want to create a RHEL 4.5 to 4.8 VM, you must install the Citrix-provided RHEL 4.8 kernel after installing the operating system. Citrix includes this kernel in the Citrix Tools for VMs, and it fixes issues in the RHEL kernel which prevents XenServer from running correctly.

Installing RHEL 4.5 to 4.8 requires using the following process:

1. Create the VM using the New VM wizard or the CLI.
2. Install the RHEL operating system using Red Hat's installation media.
3. Install Citrix Tools for VMs on the new VM. This automatically installs the Citrix-provided RHEL 4.8 kernel on the VM.

4. Follow the process for installing the Linux Guest Agent, setting the time, and configuring the VNC. See the overview *Installing Linux VMs*.

Installing Red Hat, CentOS, Oracle Enterprise, and SUSE Enterprise Linux from vendor media

XenServer supports the installation of the following Linux operating systems from vendor media in the XenServer host DVD/CD-ROM drive:

- Red Hat Enterprise Linux 5.0-5.4, 32-bit
- Red Hat Enterprise Linux 5.0-5.4, 64-bit
- CentOS 4.5-4.6
- CentOS 5.0-5.4, 32-bit
- CentOS 5.0-5.4, 64-bit
- Oracle Enterprise Linux 5.0-5.4, 32-bit
- Oracle Enterprise Linux 5.0-5.4, 64-bit
- SUSE Enterprise Linux, 10, SP1, SP2, 32-bit
- SUSE Enterprise Linux, 10, SP1, SP2, SP3, 64-bit
- SUSE Enterprise Linux, 11, 32-bit
- SUSE Enterprise Linux, 11, 64-bit

Other Linux operating systems need to be installed from a network installation server. See the section called "Installing Linux from a network installation server to a VM".

To install a supported Linux VM from vendor media using the CLI

1. Insert the vendor installation CD into the CD drive on the XenServer host.
2. Run the command **xe template-list** to find the name of the template corresponding to the OS you want to install.
3. Run the command:

   ```
   xe vm-install template="<template_name>" new-name-label=<name_for_vm>
   ```

   This command returns the UUID of the new VM.
4. Get the UUID of the root disk of the new VM:

   ```
   xe vbd-list vm-uuid=<vm_uuid> userdevice=0 params=uuid --minimal
   ```
5. Using the UUID returned, set the root disk to not be bootable:

   ```
   xe vbd-param-set uuid=<root_disk_uuid> bootable=false
   ```
6. Get the name of the physical CD drive on the XenServer host:

   ```
   xe cd-list
   ```

   The result of this command should give you something like SCSI 0:0:0:0 for the *name-label* field.
7. Add a virtual CD-ROM to the new VM using the XenServer host CD drive *name-label* parameter as the *cd-name* parameter:

   ```
   xe vm-cd-add vm=<vm_name> cd-name="<host_cd_drive_name_label>" device=3
   ```

8. Get the UUID of the VBD corresponding to the new virtual CD drive:

```
xe vbd-list vm-uuid=<vm_uuid> type=CD params=uuid --minimal
```

9. Make the VBD of the virtual CD bootable:

```
xe vbd-param-set uuid=<cd_drive_uuid> bootable=true
```

10. Set the install repository of the VM to be the CD drive:

```
xe vm-param-set uuid=<vm_uuid> other-config:install-repository=cdrom
```

11. Start the VM

```
xe vm-start uuid=<vm_uuid>
```

12. Open a console to the VM with XenCenter or an SSH terminal and follow the steps to perform the OS installation.

Note:

The console in XenCenter supports VNC graphical installation of the Red Hat, Oracle, and CentOS operating systems. Ensure that the virtual machine has enough memory allocated for this to be enabled. If you set the memory allocation to 512MB or higher, you will be prompted to start VNC after the initial text screens. Choosing to continue using VNC and setting a password will enable the **Switch to Graphical Console** button.

Installing Linux from a network installation server to a VM

The XenServer guest installer allows you to install an operating system from a network-accessible copy of vendor media onto a VM. To prepare for installing from vendor media, make an exploded network repository of your vendor media (*not* ISO images) and export it over NFS, HTTP or FTP so that it is accessible to the XenServer host administration interface. See Appendix B, *Setting Up a Red Hat Installation Server* for information on how to copy a set of installation CDs to a network drive.

The network repository must be accessible from the control domain of the XenServer host, normally using the management interface. The URL must point to the base of the CD/DVD image on the network server, and be of the form:

- **HTTP**
  http://*<server>*/*<path>*
- **FTP**
  ftp://*<server>*/*<path>*
- **NFS**
  nfs://*<server>*/*<path>* or nfs://*<server>*/*<path>*

See the vendor's installation instructions for information about how to prepare for a network-based installation, such as where to unpack the ISO.

Note that when using the NFS installation method from XenCenter, the `nfs://` style of path should always be used. XenCenter will then modify this into the correct form when passing it to the server automatically. When using the CLI as per the instructions below, the appropriate form must be chosen manually. In the case of SUSE-based distributions this is the `nfs://<server>/<path>` style, and in the case of Red-Hat based distributions this is `nfs:<server>:/<path>`.

When creating VMs from templates, the XenCenter **New VM** wizard prompts you for the repository URL. When using the CLI, install the template as normal using **vm-install** and then set the **other-config:install-repository** parameter to the value of the URL. When the VM is subsequently started, it will begin the network installation process.

Note:

When installing a new Linux-based VM, it is important to fully finish the installation and reboot it before performing any other operations on it. This is analogous to not interrupting a Windows installation — which would leave you with a non-functional VM.

To install a Linux VM from a network-accessible copy of vendor media using the CLI

1. Run the command

   ```
   xe vm-install template=<template> new-name-label=<name_for_vm> \
   sr-uuid=<storage_repository_uuid>
   ```

   This command returns the UUID of the new VM.
2. Find the UUID of the network that you want to connect to. For example, if it is the one attached to *xenbr0*:

   ```
   xe network-list bridge=xenbr0 --minimal
   ```
3. Create a VIF to connect the new VM to this network:

   ```
   xe vif-create vm-uuid=<vm_uuid> network-uuid=<network_uuid> mac=random device=0
   ```
4. Set the `install-repository` key of the *`other-config`* parameter to the path of your network repository. For example, to use `http://server/RedHat/5.0` as the URL of the vendor media:

   ```
   xe vm-param-set uuid=<vm_uuid> \
   other-config:install-repository=<http://server/redhat/5.0>
   ```
5. Start the VM

   ```
   xe vm-start uuid=<vm_uuid>
   ```
6. Connect to the VM console using XenCenter or VNC and perform the OS installation.

Installing RHEL using a kickstart file

When you are installing RHEL through XenCenter's New VM Wizard, you can automate the installation by using a *Red Hat Kickstart* file. A Red Hat Kickstart file is an automated installation method, similar to an answer file, you can use to provide responses to RHEL's installation prompts. To create this file, install RHEL manually. The kickstart file is located in `/root/anaconda-ks.cfg`.

To install RHEL Linux using a custom kickstart file (from XenCenter)

1. In XenCenter, choose the appropriate RHEL template
2. Specify the kickstart file to use as a kernel command-line argument in the XenCenter New VM Wizard, exactly as it would be specified in the PXE config file, for example:

   ```
   ks=http://server/fileksdevice=eth0
   ```
3. On the command line, use **vm-param-set** to set the `PV-args` parameter to make use of a Kickstart file

   ```
   xe vm-param-set uuid=<vm_uuid> PV-args=<"ks=http://server/path ksdevice=eth0">
   ```
4. Set the repository location so XenServer knows where to get the kernel and `initrd` from for the installer boot:

   ```
   xe vm-param-set uuid=<vm_uuid> other-config:install-repository=<http://server/path>
   ```

Note:

To install using a kickstart file without the **New VM** wizard, you can add the appropriate command to the **Advanced OS boot parameters** text box. For example, for RHEL 5.4, this command would be `ks=nfs:telos:/linux/distros/auto-install/rhel54.cfg`.

Installing the Linux guest agent

Although all the supported Linux distributions are natively paravirtualized (and therefore do not need special drivers for full performance), XenServer includes a guest agent which provides additional information about the VM to the host. This additional information includes:

- Linux distribution name and version (major, minor revision).
- Kernel version (`uname`).
- IP address of each Ethernet interface.
- Total and free memory within the VM.

It is important to install this agent and keep it up-to-date (see *Updating VMs*) as you upgrade your XenServer host.

To install the guest agent

1. The files required are present on the built-in `xs-tools.iso` CD image, or alternatively can be installed by using the **VM > Install Citrix Tools for Virtual Machines** option in XenCenter.
2. Mount the image onto the guest by running the command:

   ```
   mount /dev/xvdd /mnt
   ```
3. Execute the installation script as the root user:

   ```
   /mnt/Linux/install.sh
   ```
4. If the kernel has been upgraded, or the VM was upgraded from a previous version, reboot the VM now.

Note:

CD-ROM drives and ISOs attached to Linux Virtual Machines appear as `/dev/xvdd` instead of as `/dev/cdrom` as you might expect. This is because they are not true CD-ROM devices, but normal devices. When the CD is ejected by either XenCenter or the CLI, it hot-unplugs the device from the VM and the device disappears. This is different from Windows Virtual Machines, where the CD remains in the VM in an empty state.

Time handling in Linux VMs

By default, the clocks in a Linux VM are synchronized to the clock running on the control domain, and cannot be independently changed. This mode is a convenient default, since only the control domain needs to be running the NTP service to keep accurate time across all VMs. Upon installation of a new Linux VM, make sure you change the time-zone from the default UTC to your local value (see the section called “Release Notes” for specific distribution instructions).

To set individual Linux VMs to maintain independent times

1. From a root prompt on the VM, run the command: **echo 1 > /proc/sys/xen/independent_wallclock**
2. This can be persisted across reboots by changing the `/etc/sysctl.conf` configuration file and adding:

```
# Set independent wall clock time
xen.independent_wallclock=1
```

3. As a third alternative, *independent_wallclock=1* may also be passed as a boot parameter to the VM.

Configuring VNC for VMs

VMs might not be set up to support Virtual Network Computing (VNC), which XenServer uses to control VMs remotely, by default. Before you can connect with the XenCenter graphical console, you need to ensure that the VNC server and an X display manager are installed on the VM and properly configured. This section describes the procedures for configuring VNC on each of the supported Linux operating system distributions to allow proper interactions with the XenCenter graphical console.

CentOS-based VMs should use the instructions for the Red Hat-based VMs below, as they use the same base code to provide graphical VNC access. CentOS 4 is based on Red Hat Enterprise Linux 4, and CentOS 5 is based on Red Hat Enterprise Linux 5.

Enabling a graphical console on Debian Lenny VMs

The graphical console for Debian Lenny virtual machines is provided by a VNC server running inside the VM. In the recommended configuration, this is controlled by a standard display manager so that a login dialog is provided.

1. Install your Lenny guest with the desktop system packages, or install GDM (the display manager) using apt (following standard procedures).
2. Install the Xvnc server using **apt-get** (or similar):

   ```
   aptitude install vnc4server
   ```

3. Set up a VNC password (not having one is a serious security risk) using the **vncpasswd** command, passing in a filename to write the password information to. For example:

   ```
   vncpasswd /etc/vncpass
   ```

4. Modify your `gdm.conf` file (`/etc/gdm/gdm.conf`) to configure a VNC server to manage display `0` by extending the `[servers]` section as follows:

   ```
   [servers]
   0=VNC

   [server-VNC]
   name=VNC
   command=/usr/bin/Xvnc -geometry 800x600 -PasswordFile /etc/vncpass BlacklistTimeout=0
   flexible=true
   ```

5. Restart GDM, and then wait for the graphical console to be detected by XenCenter:

   ```
   /etc/init.d/gdm restart
   ```

   Note:

   You can check that the VNC server is running using a command like **ps ax | grep vnc**.

Enabling a graphical console on Red Hat, CentOS, or Oracle Linux VMs

Note:

Before setting up your Red Hat VMs for VNC, be sure that you have installed the Linux guest agent. See the section called "Installing the Linux guest agent" for details.

To configure VNC on Red Hat VMs, you need to modify the GDM configuration. The GDM configuration is held in a file whose location varies depending on the version of Red Hat Linux you are using. Before modifying it, first determine the location of this configuration file; this file will then be modified in a number of subsequent procedures in this section.

Determining the location of your VNC configuration file

If you are using Red Hat Linux version 4 the GDM configuration file is `/etc/X11/gdm/gdm.conf`. This is a unified configuration file that contains default values as specified by the provider of your version of GDM in addition to your own customized configuration. This type of file is used by default in older versions of GDM, as included in these versions of Red Hat Linux.

If you are using Red Hat Linux version 5 the GDM configuration file is `/etc/gdm/custom.conf`. This is a split configuration file that contains only user-specified values that override the default configuration. This type of file is used by default in newer versions of GDM, as included in these versions of Red Hat Linux.

Configuring GDM to use VNC

1. As root on the text CLI in the VM, run the command **rpm -q vnc-server gdm**. The package names `vnc-server` and `gdm` should appear, with their version numbers specified.

   If these package names are displayed, the appropriate packages are already installed. If you see a message saying that one of the packages is not installed, then you may not have selected the graphical desktop options during installation. You will need to install these packages before you can continue. See the appropriate *Red Hat Linux x86 Installation Guide* for details regarding installing additional software on your VM.

2. Open the GDM configuration file with your preferred text editor and add the following lines to the file:

   ```
   [server-VNC]
   name=VNC Server
   command=/usr/bin/Xvnc -SecurityTypes None -geometry 1024x768 -depth 16 \
   -BlacklistTimeout 0
   flexible=true
   ```

   - With configuration files on Red Hat Linux 3 and 4, this should be added above the `[server-Standard]` section.
   - With configuration files on Red Hat Linux 5, this should be added into the empty `[servers]` section.

3. Modify the configuration so that the `Xvnc` server is used instead of the standard X server:

   - If you are using Red Hat Linux 3 or 4, there will be a line just above that reads:

     ```
     0=Standard
     ```

     Modify it to read:

     ```
     0=VNC
     ```

   - If you are using Red Hat Linux 5 or greater, add the above line just below the `[servers]` section and before the `[server-VNC]` section.

4. Save and close the file.

Restart GDM for your change in configuration to take effect, by running the command **/usr/sbin/gdm-restart**.

Note:

Red Hat Linux uses runlevel 5 for graphical startup. If your installation is configured to start up in runlevel 3, change this for the display manager to be started (and therefore to get access to a graphical console). See the section called "Checking runlevels" for further details.

Firewall settings

The firewall configuration by default does not allow VNC traffic to go through. If you have a firewall between the VM and XenCenter, you need to allow traffic over the port that the VNC connection uses. By default, a VNC server listens for connections from a VNC viewer on TCP port `5900 + n`, where n is the display number (usually just zero). So a VNC server setup for Display-0 will listen on TCP port `5900`, Display-1 is `TCP-5901`, and so on. Consult your firewall documentation to make sure these ports are open.

You might want to further customize your firewall configuration if you want to use IP connection tracking or limit the initiation of connections to be from one side only.

To customize Red Hat-based VMs firewall to open the VNC port

1. For Red Hat Linux 4 and 5, use **system-config-securitylevel-tui**.
2. Select "Customize" and add *`5900`* to the other ports list.

Alternatively, you can disable the firewall until the next reboot by running the command **service iptables stop**, or permanently by running **chkconfig iptables off**. This can of course expose additional services to the outside world and reduce the overall security of your VM.

VNC screen resolution

If, after connecting to a VM with the graphical console, the screen resolution is mismatched (for example, the VM display is too big to comfortably fit in the Graphical Console pane), you can control it by setting the VNC server *`geometry`* parameter as follows:

1. Open the GDM configuration file with your preferred text editor. See the section called "Determining the location of your VNC configuration file" for information about determining the location of this file.
2. Find the `[server-VNC]` section you added above.
3. Edit the command line to read, for example:

   ```
   command=/usr/bin/Xvnc -SecurityTypes None -geometry 800x600
   ```

   where the value of the *`geometry`* parameter can be any valid screen width and height.
4. Save and close the file.

Setting up SLES-based VMs for VNC

Note:

Before setting up your SUSE Linux Enterprise Server VMs for VNC, be sure that you have installed the Linux guest agent. See the section called "Installing the Linux guest agent" for details.

SLES has support for enabling "Remote Administration" as a configuration option in `YaST`. You can select to enable Remote Administration at install time, available on the **Network Services** screen of the SLES installer. This allows you to connect an external VNC viewer to your guest to allow you to view the graphical console; the methodology for using the SLES remote administration feature is slightly different than that provided by XenCenter, but it is possible to modify the configuration files in your SUSE Linux VM such that it is integrated with the graphical console feature.

Checking for a VNC server

Before making configuration changes, verify that you have a VNC server installed. SUSE ships the `tightvnc` server by default; this is a suitable VNC server, but you can also use the standard RealVNC distribution if you prefer.

You can check that you have the `tightvnc` software installed by running the command:

```
rpm -q tightvnc
```

Enabling Remote Administration

If Remote Administration was not enabled during installation of the SLES software, you can enable it as follows:

1. Open a text console on the VM and run the `YaST` utility:

   ```
   yast
   ```

2. Use the arrow keys to select **Network Services** in the left menu, then **Tab** to the right menu and use the arrow keys to select **Remote Administration**. Press **Enter**.
3. In the **Remote Administration** screen, **Tab** to the **Remote Administration Settings** section. Use the arrow keys to select **Allow Remote Administration** and press **Enter** to place an X in the check box.
4. **Tab** to the **Firewall Settings** section. Use the arrow keys to select **Open Port in Firewall** and press **Enter** to place an X in the check box.
5. **Tab** to the **Finish** button and press **Enter**.
6. A message box is displayed, telling you that you will need to restart the display manager for your settings to take effect. Press **Enter** to acknowledge the message.
7. The original top-level menu of `YaST` appears. **Tab** to the **Quit** button and press **Enter**.

Modifying the xinetd configuration

After enabling Remote Administration, you need to modify a configuration file if you want to allow XenCenter to connect, or else use a third party VNC client.

1. Open the file `/etc/xinetd.d/vnc` in your preferred text editor.

   The file contains sections like the following:

   ```
   service vnc1
   {
   socket_type = stream
   protocol    = tcp
   wait        = no
   user        = nobody
   server      = /usr/X11R6/bin/Xvnc
   server_args = :42 -inetd -once -query localhost -geometry 1024x768 -depth 16
   type        = UNLISTED
   port        = 5901
   }
   ```

2. Edit the `port` line to read

   ```
   port = 5900
   ```

3. Save and close the file.
4. Restart the display manager and `xinetd` service with the following commands:

```
/etc/init.d/xinetd restart
rcxdm restart
```

SUSE Linux uses runlevel 5 for graphical startup. If your remote desktop does not appear, verify that your VM is configured to start up in runlevel 5. Refer to the section called "Checking runlevels" for details.

Firewall settings

By default the firewall configuration does not allow VNC traffic to go through. If you have a firewall between the VM and XenCenter, you need to allow traffic over the port that the VNC connection uses. By default, a VNC server listens for connections from a VNC viewer on TCP port `5900 + n`, where n is the display number (usually just zero). So a VNC server setup for Display-0 will listen on TCP port `5900`, Display-1 is `TCP-5901`, etc. Consult your firewall documentation to make sure these ports are open.

You might want to further customize your firewall configuration if you want to use IP connection tracking or limit the initiation of connections to be from one side only.

To open the VNC port on a SLES-based VMs firewall

1. Open a text console on the VM and run the `YaST` utility:

   ```
   yast
   ```

2. Use the arrow keys to select **Security and Users** in the left menu, then **Tab** to the right menu and use the arrow keys to select **Firewall**. Press **Enter**.
3. In the **Firewall** screen, **Tab** to the **Firewall Configuration: Settings** section. Use the arrow keys to select the **Allowed Services** in the left menu.
4. **Tab** to the **Firewall Configuration: Allowed Services** fields on the right. Use the arrow keys to select the **Advanced...** button (near the bottom right, just above the **Next** button) and press **Enter**.
5. In the **Additional Allowed Ports** screen, enter *5900* in the **TCP Ports** field. **Tab** to the **OK** button and press **Enter**.
6. **Tab** back to the list of screens on the left side and use the arrow keys to select **Start-Up**. **Tab** back to the right and **Tab** to the **Save Settings and Restart Firewall Now** button and press **Enter**.
7. **Tab** to the **Next** button and press **Enter**, then in the **Summary** screen **Tab** to the **Accept** button and press **Enter**, and finally on the top-level `YaST` screen **Tab** to the **Quit** button and press **Enter**.
8. Restart the display manager and `xinetd` service with the following commands:

   ```
   /etc/init.d/xinetd restart
   rcxdm restart
   ```

Alternatively, you can disable the firewall until the next reboot by running the **rcSuSEfirewall2 stop** command, or permanently by using `YaST`. This can of course expose additional services to the outside world and reduce the overall security of your VM.

VNC screen resolution

If, after connecting to a Virtual Machine with the Graphical Console, the screen resolution is mismatched (for example, the VM display is too big to comfortably fit in the Graphical Console pane), you can control it by setting the VNC server *`geometry`* parameter as follows:

1. Open the `/etc/xinetd.d/vnc` file with your preferred text editor and find the `service_vnc1` section (corresponding to `displayID` 1).
2. Edit the `geometry` argument in the `server-args` line to the desired display resolution. For example,

```
server_args  = :42 -inetd -once -query localhost -geometry 800x600 -depth 16
```

where the value of the *geometry* parameter can be any valid screen width and height.

3. Save and close the file.
4. Restart the VNC server:

```
/etc/init.d/xinetd restart
rcxdm restart
```

Checking runlevels

Red Hat and SUSE Linux VMs use runlevel 5 for graphical startup. This section describes how to verify that your VM is configured to start up in runlevel 5 and how to change it if it is not.

1. Check `/etc/inittab` to see what the default runlevel is set to. Look for the line that reads:

   ```
   id:n:initdefault:
   ```

   If *n* is not 5, edit the file to make it so.
2. You can run the command **telinit q ; telinit 5** after this change to avoid having to actually reboot to switch runlevels.

Preparing to clone a Linux VM

Typically, when cloning a VM or a computer, unless you "generalize" the cloned image, attributes unique to that machine, such as the IP address, SID, or MAC address, will be duplicated in your environments.

As a result, XenServer automatically changes some virtual hardware parameters when you clone a Linux VM. If you copy the VM using XenCenter, XenCenter automatically changes the MAC address and IP address for you. If these interfaces are configured dynamically in your environment, you might not need to make any modifications to the cloned VM. However, if the interfaces are statically configured, you might need to modify their network configurations.

The VM may need to be customized to be made aware of these changes. For instructions for specific supported Linux distributions, see the section called “Release Notes”.

Machine Name

A cloned VM is another computer, and like any new computer in a network, it must have a unique name within the network domain it is part of.

IP address

A cloned VM must have a unique IP address within the network domain it is part of. Generally, this is not a problem if DHCP is used to assign addresses; when the VM boots, the DHCP server will assign it an IP address. If the cloned VM had a static IP address, the clone must be given an unused IP address before being booted.

MAC address

There are two situations when Citrix recommends disabling MAC address rules before cloning:

1. In some Linux distributions, the MAC address for the virtual network interface of a cloned VM is recorded in the network configuration files. However, when you clone a VM, XenCenter assigns the new cloned

VM a different MAC address. As a result, when the new VM is started for the first time, the network does recognize the new VM and does not come up automatically.

2. Some Linux distributions use `udev` rules to remember the MAC address of each network interface, and persist a name for that interface. This is intended so that the same physical NIC always maps to the same `eth<n>` interface, which is particularly useful with removable NICs (like laptops). However, this behavior is problematic in the context of VMs. For example, if you configure two virtual NICs when you install a VM, and then shut it down and remove the first NIC, on reboot XenCenter shows just one NIC, but calls it `eth0`. Meanwhile the VM is deliberately forcing this to be `eth1`. The result is that networking does not work.

If the VM uses persistent names, Citrix recommends disabling these rules before cloning. If for some reason you do not want to turn persistent names off, you must reconfigure networking inside the VM (in the usual way). However, the information shown in XenCenter will not match the addresses actually in your network.

Release Notes

Most modern Linux distributions support Xen paravirtualization directly, but have different installation mechanisms and some kernel limitations.

Debian Lenny 5.0

XenServer support for Debian Lenny makes use of support from the distribution to perform an installation into a virtual machine, in a similar manner to the other supported Linux distributions. This provides a more customizable configuration and native support for automation of the installation, and so on. Making use of these features is documented later in this guide. However this does mean that some configuration of VNC may have to be done manually if you want a graphical console.

> Note:
>
> Network installation support is provided by the distribution so HTTP and FTP installation is supported. Installation from a CD or DVD is also supported. Only 32-bit Debian Lenny is supported due to the upstream limitations.

To avoid receiving the message `There is no public key available for the following key IDs` when running **apt-get update**, run the following command to download the appropriate key:

```
wget -O - http://updates.vmd.citrix.com/XenServer/5.6/GPG-KEY \
| sudo apt-key add -
```

Red Hat Enterprise Linux 4.5 to 4.8

XenServer includes the RHEL 4.8 kernel with additional bug fixes and expanded Xen support. This kernel is installed with the Citrix Tools for Virtual Machines installation, but is not included if you install Red Hat's default RHEL 4.5 to 4.7 installations.

The following issues have been reported to Red Hat and are already fixed in the Xen kernel (which can be installed by using the `/mnt/Linux/install.sh` script in the built-in `xs-tools.iso` CD image):

- The Xen kernel in RHEL 4.8 can occasionally enter tickless mode when an RCU is pending. When this triggers, it is usually in `synchronize_kernel()` which means the guest essentially hangs until some external event (such as a `SysRQ`) releases it (Red Hat Bugzilla 427998)
- Live migration can occasionally crash the kernel under low memory conditions (Red Hat Bugzilla 249867)
- Guest kernel can occasionally hang due to other XenStore activity (Red Hat Bugzilla 250381)

- If you try to install RHEL 4.x on a VM that has more than two virtual CPUs (which RHEL 4.x does not support), an error message incorrectly reports the number of CPUs detected.
- RHEL 4.7 contains a bug which normally prevents it from booting on a host with more than 64GiB of RAM (Red Hat Bugzilla 311431). For this reason XenServer RHEL 4.7 guests are only allocated RAM addresses in the range below 64GiB by default. This may cause RHEL 4.7 guests to fail to start even if RAM appears to be available, in which case rebooting or shutting down other guests can cause suitable RAM to become available. If all else fails, temporarily shut down other guests until your RHEL 4.7 VM can boot.

  Once you have succeeded in booting your RHEL 4.7 VM, install the Citrix Tools for Virtual Machines and run the command:

  ```
  xe vm-param-remove uuid=<vm_uuid> param-name=other-config \
  param-key=machine-address-size
  ```

  to remove the memory restriction.
- On some hardware (generally newer systems), the CPU will generate occasional spurious page faults which the OS should ignore. Unfortunately all versions of RHEL 4 fail to ignore the spurious fault and it causes them to crash (Red Hat Bugzilla 465914).

  This has been fixed in our kernel. The RHEL 4 VM templates have been set with the *suppress-spurious-page-faults* parameter. This assures that the installation will continue safely to the point that the standard kernel is replaced with the Citrix-provided kernel.

  There is a performance impact with this parameter set, so, after the VM installation is complete, at the VM command prompt, run the command:

  ```
  xe vm-param-remove uuid=<vm_uuid> other-config: \
  param-key=suppress-spurious-page-faults
  ```
- In RHEL 4.5 to 4.7, if a xenbus transaction end command fails it is possible for the suspend_mutex to remain locked preventing any further xenbus traffic. Applying the Citrix RHEL 4.8 kernel resolves this issue. [EXT-5]
- RHEL 4.7, 4.8, sometimes when there are many devices attached to a VM, there is not enough time for all of these devices to connect and startup fails. [EXT-17]
- In RHEL 4.5 to 4.8, use of the XFS filesystem can lead to kernel panic under exceptional circumstances. Applying the Citrix RHEL 4.8 kernel resolves this issue. [EXT-16]
- In RHEL 4.5 to RHEL 4.8, the kernel can enter no tick idle mode with RCU pending; this leads to a guest operating system lock up. Applying the Citrix RHEL 4.8 kernel resolves this issue. [EXT-21]
- In RHEL 4.7, 4.8, VMs may crash when a host has 64GiB RAM or higher configured. Applying the Citrix RHEL 4.8 kernel resolves this issue. [EXT-30]
- In RHEL 4.5 to 4.8 and 5.0 to 5.3, the network driver contains an issue that can, in rare circumstances, lead to a kernel deadlock. Applying the Citrix RHEL 4.8 kernel resolves this issue. [EXT-45]

Preparing a RHEL 4.5 to 4.8 guest for cloning

To prepare a RHEL 4.5 to 4.8 guest for cloning (see the section called “MAC address”), edit `/etc/sysconfig/network-scripts/ifcfg-eth0` before converting the VM into a template, and remove the `HWADDR` line.

> Note:
>
> Red Hat recommends the use of Kickstart to perform automated installations, instead of directly cloning disk images (see Red Hat KB Article 1308).

RHEL Graphical Network Install Support

To perform a graphical installation, add `VNC` to the list of advanced OS boot parameters when creating the VM:

```
graphical utf8 vnc
```

You will be prompted to provide networking configuration for the new VM so that VNC communication can be enabled. The standard graphical installer will then be displayed.

Red Hat Enterprise Linux 5

XenServer requires that you run the RHEL 5.4 kernel or higher. These kernels have the following known issues:

- During the resume operation on a suspended VM, allocations can be made that can cause swap activity which cannot be performed because the swap disk is still being reattached. This is a rare occurrence. (Red Hat Bugzilla 429102).
- In RHEL 5.3, sometimes when there are many devices attached to a VM, there is not enough time for all of these devices to connect and startup fails. [EXT-17]
- In RHEL 5.0 to 5.3, use of the XFS file system can lead to kernel panic under exceptional circumstances. Applying the Red Hat RHEL 5.4 kernel onwards resolves this issue. [EXT-16]
- In RHEL 5.2, 5.3, VMs may crash when a host has 64GiB RAM or higher configured. Applying the Red Hat RHEL 5.4 kernel onwards resolves this issue. [EXT-30]
- In RHEL 5.0 to 5.3, the network driver contains an issue that can, in rare circumstances, lead to a kernel deadlock. Applying the Red Hat RHEL 5.4 kernel onwards resolves this issue. [EXT-45]

When you install the XenServer `xe-guest-utilities` RPM, an entry is added to the yum configuration, allowing you to pick up kernel updates provided by Citrix when they become available.

> Note:
>
> In previous releases, XenServer included a replacement RHEL 5 kernel that fixed critical issues that prevented RHEL 5 from running effectively as a virtual machine. Red Hat has resolved these issues in RHEL 5.4 and higher. Consequently, XenServer no longer includes a RHEL 5 specific kernel

Preparing a RHEL 5.x guest for cloning

To prepare a RHEL 5.x guest for cloning (see the section called “MAC address”), edit `/etc/sysconfig/network-scripts/ifcfg-eth0` before converting the VM into a template and remove the `HWADDR` line.

> Note:
>
> Red Hat recommends the use of Kickstart to perform automated installations, instead of directly cloning disk images (see Red Hat KB Article 1308).

CentOS 4

Please refer to the section called “Red Hat Enterprise Linux 4.5 to 4.8” for the list of CentOS 4 release notes.

Unlike RHEL4, CentOS includes a third-party updates mechanism known as yum. The `xe-guest-utilities` RPM will install a XenServer entry for `yum`, allowing you to pick up kernel updates provided by Citrix using the standard update mechanism as they become available.

CentOS 5

Please refer to the section called “Red Hat Enterprise Linux 5” for the list of CentOS 5 release notes.

Oracle Enterprise Linux 5

Please refer to the section called “Red Hat Enterprise Linux 5” for the list of Oracle Enterprise Linux 5 release notes.

SUSE Enterprise Linux 9

XenServer uses a SUSE-provided kernel. (Earlier versions of XenServer included a Citrix-provided version of the SLES9 which had a more mature version of the hypervisor, but which was out of date with the SUSE version, particularly with regard to security updates.) SUSE Enterprise Linux 9 VMs, with multiple VPCUs, are unable to use the suspend, resume and XenMotion functionality.

> Note:
>
> On upgrade from XenServer 5.5 to XenServer 5.6 we recommend that you should upgrade to the latest kernel from Novell.

To prepare a SUSE Linux guest for cloning (see the section called “MAC address”), edit `/etc/sysconfig/network/config` and edit the line:

```
FORCE_PERSISTENT_NAMES=yes
```

to

```
FORCE_PERSISTENT_NAMES=no
```

SUSE Enterprise Linux 10 SP1

XenServer uses the standard Novell kernel supplied with SLES 10 SP2 as the guest kernel. Any bugs found in this kernel are reported upstream to Novell and listed below:

- A maximum of 3 virtual network interfaces is supported.
- Disks sometimes do not attach correctly on boot. (Novell Bugzilla 290346).

SUSE Enterprise Linux 11

XenServer uses the standard Novell kernel supplied with SLES 11 as the guest kernel. Any bugs found in this kernel are reported upstream to Novell and listed below:

- Live migration of a SLES 11 VM which is under high load may fail with the message `An error occurred during the migration process`. This is due to a known issue with the SLES 11 kernel which has been reported to Novell. It is expected that kernel update 2.6.27.23-0.1.1 and later from Novell will resolve this issue.

CITRIX

Updating VMs

This chapter discusses updating VMs with new Linux kernel revisions, updating Windows operating systems, applying Windows Service Packs, and updates to XenServer PV drivers and VM utilities.

Upgrades to VMs are typically required when moving to a new version of XenServer. The following are current issues involving upgrading VMs running on XenServer to this version:

- XenMotion of Windows VMs is not supported until the PV drivers are upgraded.
- Suspend/Resume of Windows VMs is not supported until the PV drivers are upgraded.
- The use of certain anti-virus and firewall applications can crash the Windows VM unless the PV drivers are upgraded.

Updating Windows operating systems

> **Warning:**
>
> Before updating Windows operating systems you must uninstall the PV device drivers. If they are present during the attempt to update, the update will fail.

Windows installation disks typically provide an upgrade option if you boot them on a server which has an earlier version of Windows already installed. So if, for example, you have a Windows 2000 server, and you wish to update it to Windows 2003, you can insert the Windows 2003 installation CD in the CD drive and run the setup program to update it.

You can update the operating system of Windows VMs in a similar way.

To uninstall the PV drivers

1. From the **Start** button, select **Control Panel** from the menu.
2. In Windows XP, 2000, or 2003, select **Add or Remove Programs**.

   In Windows 7 and Vista, select **Programs**, then select **Programs and Features**.
3. A list of programs installed on the computer is displayed. Scroll down if necessary and select **Citrix XenServer Windows PV drivers Add-on**.
4. In Windows XP, 2000, or 2003, click the **Remove** button.

   In Windows Vista, select **Uninstall** from the toolbar above the list of programs.

   This removes the PV drivers add-on. When the operation completes a message is displayed. Click **OK** to close the message box.

Once the operating system update is complete, reinstall the PV drivers just as you would after installing a fresh Windows VM. See the section called “Windows PV drivers” for details.

Updating PV drivers for Windows VMs

The PV drivers are present on the built-in `xs-tools.iso` available to XenCenter from the **Install XenServer Tools** command from the **VM** menu, which attaches the CD image containing the drivers to the VM. You can either wait for the auto-run facility, or manually click on the `xensetup.exe` program. Follow the on-screen prompts to install the new drivers, which will automatically deactivate and upgrade the old drivers.

Updating Linux kernels and guest utilities

The Linux guest utilities can be updated by rerunning the `Linux/install.sh` script from the built-in `xs-tools.iso` CD image (see the section called “Installing the Linux guest agent”). From time to time, Citrix also supplies updated RHEL 4.x Linux kernels for supported distributions on its Web site (http://updates.vmd.citrix.com/XenServer/5.6.0/rhel4x/). Because Citrix no longer provides RHEL 5.x kernels, you should obtain updates to RHEL 5.4 and higher kernels directly from Red Hat.

Rerunning the `Linux/install.sh` script from the built-in `xs-tools.iso` is particularly important for CentOS versions prior to 5.3, where you will get the upstream kernel by default, which has certain limitations (see the section called “Release Notes”).

For `yum`-enabled distributions (CentOS 4 and 5, RHEL 5.4 and higher), `xe-guest-utilities` installs a `yum` configuration file to enable subsequent updates to be done using `yum` in the standard manner.

For Debian, `/etc/apt/sources.list` is populated to enable updates using apt by default.

When upgrading, Citrix recommends that you always rerun `Linux/install.sh` when you upgrade. This script automatically determines if your VM needs a kernel update and installs it if necessary.

Note:

SLES is also supported, but Citrix does not provide an updated kernel.

Importing and exporting appliances

You can import and export VMs as an *appliance package*, which is a collection of one or more VMs, as well as disk images, using the XenServer OVF Appliance Wizard in XenCenter.

Important:

The XenServer OVF Appliance Wizard is experimental at this time. Use at your own risk.

When you export VMs in an appliance, they are exported as the configuration data along with the virtual hard disks of with each VM. When the appliance is exported, an OVF file is created that explains how to the wizard should reassemble the VMs in the package. The OVF file describes the way these virtual hard disks join together to form a VM and the resource settings (CPU, memory, disk space) associated with that VM.

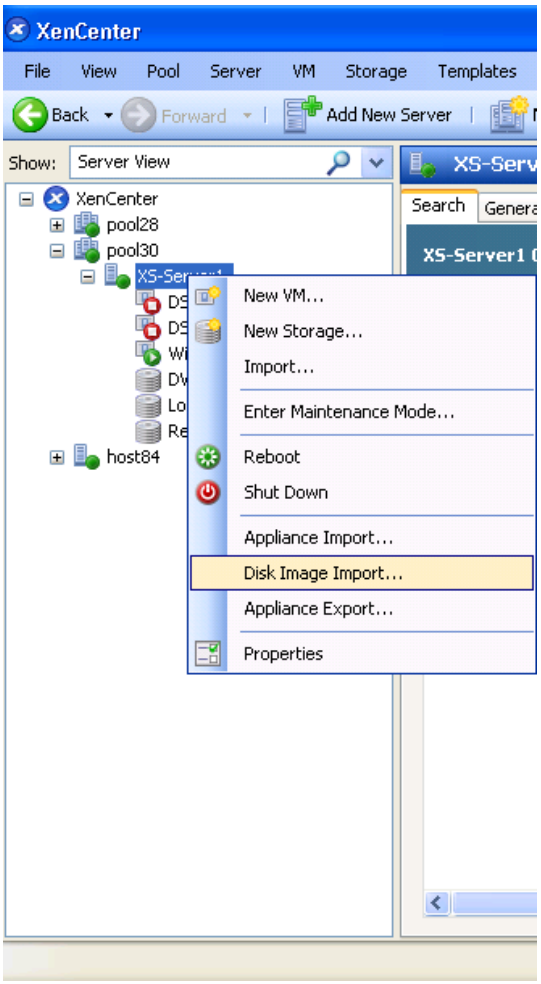
When you import the appliance, the wizard reads the OVF file to determine the resource requirements for the VMs in the appliance and what virtual disks are associated with each VM and then reconstitutes them.

Tip:

To see the VMs associated with an imported appliance in XenCenter, display the **Folder** view.

XenServer OVF Appliance Wizard

The XenServer OVF Appliance Wizard comprises three wizards: **Appliance Export**, **Appliance Import**, and **Disk Image Import**.



This illustration shows how selecting a host and right-clicking on it is the only way to launch the Disk Image Import wizard.

To start an Appliance Wizard, select the object in the XenCenter tree where you want to export from or import to, and then select one of the following:

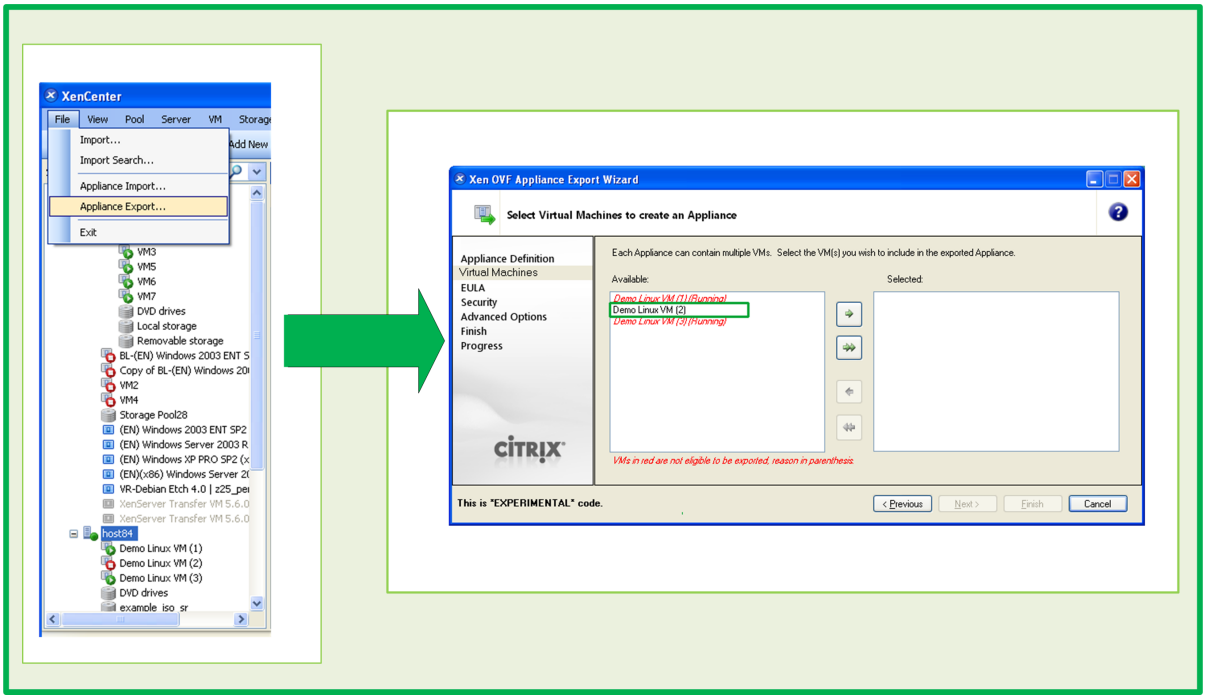
Action	Menu command
Export VMs as an appliance	**File > Appliance Export**
Import appliances	**File > Appliance Import**
Import a disk image	Right-click the host where you want to import the image and select **Disk Image Import**

Tip:

You can also start the Appliance Export and Appliance Import wizards by right-clicking on an object and selecting the menu command.

When you launch an Appliance Wizard, the node you selected in the XenCenter tree determines the scope of the wizard. For example, if you select a host and then launch the Appliance Export Wizard, the wizard only displays the VMs that are powered off on that host.

XenCenter node selected	Scope of wizard
XenCenter (root)	Powered off VMs on any host to which XenCenter is currently connected.
Resource pool	All powered off VMs on all hosts in the pool.
Host	All powered off VMs on the host.
VM	Only the VM selected.



This illustration shows how when a user selects Host84 before launching the Appliance Export Wizard, the wizard automatically narrows its scope to only the powered off VMs on that host.

The Appliance Import Wizard supports importing OVF appliance packages. However, due to subtle incompatibilities, the Appliance Import Wizard cannot import all OVF content. See the section called "XenServer OVF Appliance Wizard requirements" for a list of tested OVF content.

The XenServer OVF Appliance Wizard also gives you the ability to export packages in OVF and OVA format. For example, you could export a complete XenApp farm that you have already prepared for deployment with Sysprep, Microsoft's System Preparation Utility for Windows deployments.

XenServer OVF Appliance Wizard requirements

The XenServer OVF Appliance Wizard supports importing OVF content produced from the following utilities:

- VMware OVF versions 0.9, 1.0
- Citrix Kensho 1.*x*
- VirtualBox

- Citrix XenConvert 2.1 and higher
- XenServer OVF Appliance Wizard (this tool)

The XenServer OVF Appliance Wizard requires the following:

- To run the XenServer OVF Appliance Wizard, you must be logged in as root or have the Pool Administrator Role Based Access Control (RBAC) role associated with your user account.
- DHCP has to be running on the management network XenServer is using.
- The XenServer OVF Appliance Wizard requires local storage on the server on which you are running it.
- When importing from non-XenServer sources, you may want to run the Operating System Fixups while importing the appliance. For more information about Operating System Fixups, see the section called "Operating System Fixups".

Understanding OVF and OVA formats

Both OVF and OVA formats are appliance-package standards defined by the Distributed Management Task Force (DMTF). However, the times when you would use them differ significantly. This topic provides an overview of the OVF and OVA formats and why you would choose one over the other.

Open Virtualization Format (OVF)

OVF is an open standard for packaging and distributing software to be run in virtual machines. This standard describes the metadata of one or more virtual machines. An OVF Package consists of a descriptor file (*.ovf) and any other files representing the following attributes of the package:

- **Signature**. Digital signature used by a public key certificate in the X.509 format to authenticate the producer of the package.
- **Manifest**. An SHA-1 digest of every file in the package to verify its contents by detecting any corruption.
- **Virtual disks**. Files comprising virtual disks in the format defined by the virtualization product that exported the virtual disks. VMware products export a virtual disk in the Stream-Optimized VMDK format for an OVF Package. XenServer products export a virtual disk in the Dynamic VHD format for an OVF Package.

  Note:

  A virtual disk can contain a Windows or Linux operating system.

However, it also supports other non-metadata related capabilities, such as encryption, compression, archiving, EULA attachment, and annotations among other capabilities.

Open Virtualization Appliance (OVA)

An OVA package is a single archive file, in the Tape Archive (tar) format, containing the files that comprise an OVF Package.

More information

For more information about OVF and OVA formats, see the following:

- CTX121652: [Overview of the Open Virtualization Format] (http://support.citrix.com/article/CTX121652)
- [Open Virtualization Format Specification] (http://www.dmtf.org/standards/published_documents/DSP0243_1.1.0.pdf)

Selecting a package format

OVF packages contain a series of uncompressed files.

OVA packages are simply one archive file of an OVF package. OVA is useful for specific applications where it is beneficial to have just one file, such as creating packages for Web downloads.

Consider using OVA only as an option to make the package easier to handle. Using this option lengthens both the export and import processes.

OVF best practices

Consider the following best practices when importing or exporting VMs, appliances, and disk images using the XenServer OVF Appliance Wizard:

- When creating an appliance package you intend to import into XenServer, remove any vendor-specific tools from the VMs' operating systems before exporting the package. This is particularly helpful when importing VMware packages into XenServer.
- Citrix does not recommend manually editing the OVF XML file.
- Only use OVA as an option to make the package easier to manage. Using this option lengthens both the Export and Import process.
- Before importing OVF files, make sure all files are in the same folder and that folder is unique to the package. Importing OVF files (in one package) from multiple locations is not supported.

Exporting VMs as an appliance

You can use the XenServer OVF Appliance Wizard to export one or more VMs as a virtual appliance package. A VM must be shut down before exporting it. It cannot be hibernating or in a suspended state.

You can export an individual VM or all shutdown VMs in a host or pool. You can also export all shutdown VMs associated with all hosts currently connected to XenCenter.

Creating appliance packages consists of five major tasks, which you perform using the XenServer OVF Appliance Wizard:

1. Defining the name and destination of the appliance package.
2. Selecting the VMs for export.
3. Including one or more EULAs to protect the software inside the appliance package. (Optional.)
4. Configuring security for the exported package. (Optional.)
5. Configuring compression and other advanced export options, such as creating an OVA TAR file for the appliance.

Each task corresponds with a wizard page. Errors may appear on the Progress page if the export is unsuccessful.

To start creating an appliance package

1. Select the object in the XenCenter tree from which you want to export the VMs (the XenCenter root, a resource pool, a server, or a VM).
2. Select **File > Appliance Export**. The Export Wizard launches.

   Note:

   Exporting snapshots is not supported. When exporting a VM with snapshots, only the latest version since the last snapshot will be exported as a single VM.
3. Continue selecting options in the appliance wizard. Detailed information about the choices in each page is available by pressing **F1** on a wizard page to invoke the help or selecting the XenServer OVF Appliance Wizard help book in the *XenCenter Help* **Contents** tab.

Importing appliances

The Appliance Import Wizard lets you import appliances from OVF or OVA packages. When you import the appliance, it recreates the VMs described in the package in the target location you specify. These newly recreated VMs are configured with the same resources as the original VMs.

Importing appliance packages consists of seven major tasks, which you perform with the XenServer OVF Appliance Wizard:

1. Selecting the package to import.
2. Reviewing (and accepting) the EULAs associated with the software in that appliance package.
3. Selecting the Home Server for the VMs.
4. Selecting the target location that you want to use as storage for the VMs in the package.
5. Selecting the network for the VMs in the package.
6. Providing responses for security settings in the package.
7. Running Operating System Fixups (enabled by default), a XenServer utility that fixes potential issues in the operating systems on the imported VMs.

Each task corresponds with a wizard page. Errors may appear on the Progress page if the import is unsuccessful.

To start the Appliance Import Wizard

Note:

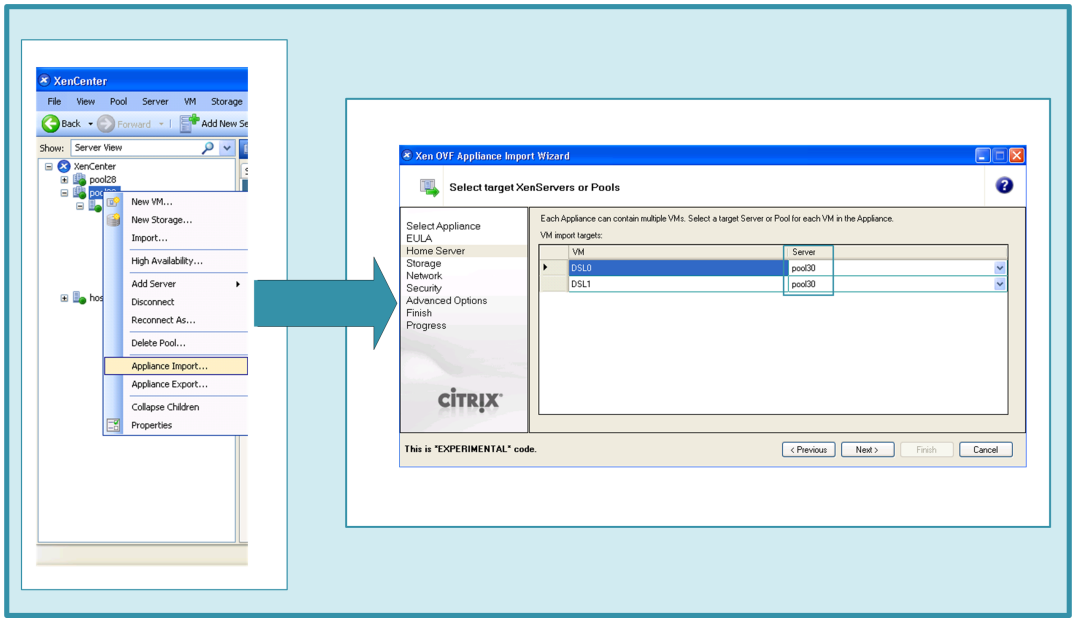
Before importing OVF files, make sure all files are in the same folder and that folder is unique to the package. Importing OVF package files from multiple locations is not supported.

Tip:

Ensure the target host has enough RAM to support the virtual machines being imported. A lack of available RAM will result in a failed import. See CTX125120 for details on how to resolve this issue.

1. Select the object in the XenCenter tree where you want the VMs in the appliance package to be located (for example, a resource pool or server).
2. Select **File > Appliance Import**. The **Appliance Import Wizard** launches.

Where you launch the Appliance Import Wizard, determines the server that appears as the home server. For example, if you have a resource pool selected when you launch the wizard, the server that appears as Home Server is the entire pool or any individual hosts within that pool.



This illustration shows how selecting Pool30 when you launch the Import Appliance wizard causes the wizard to specify that entire pool as its Home Server.

3. Continue selecting options in the appliance wizard. Detailed information about the choices in each page, see the XenServer OVF Appliance Wizard help in the *XenCenter Help*.

Operating System Fixups

Using OVF as a packaging method does not guarantee that VMs created with one hypervisor will be compatible with another. For example, sometimes after the initial import, VM appliances and disk images imported from non-XenServer hypervisors fail to boot correctly on XenServer.

VMs may not boot or operate correctly for a variety of reasons including different interpretations of the OVF specification, guest operating system devices, and drivers specific to a particular hypervisor.

To help resolve these issues, XenCenter includes an automatically booting ISO image known as the *Operating System Fixups* feature, which is an option in the XenServer OVF Appliance Wizard. XenServer OVF Appliance Import and Disk Image Import Wizards. This option is enabled by default. This option is often required when you import Windows and Linux VMs from third-party OVF packages, such as ones from VMware products. When importing XenServer or certain WIM content, enabling this option is optional.

The Operating System Fixup feature attempts to repair specific problems with the imported system that might prevent the VM's operating system from booting. Operating System Fixups creates a basic level of interoperability for OVF packages and disk images that originated on non-XenServer platforms.

When Operating System Fixups run, XenServer OVF Appliance Import and Disk Image Import Wizards attach a bootable ISO to the imported system's DVD drive. After import, when the VM is started, the ISO performs the repairs and then shuts down the VM. When the next time you start the VM, the VM starts normally.

The options to run Operating System Fixups appear on the following wizard pages:

Wizard	Page
Import Appliance	Select advanced import options
Disk Image Import	VM definition

Depending on the guest operating system and original hypervisor host, additional configuration changes, driver installation, or other actions may be required following using the fixup option.

Tip:

See CTX124961, *Operating System Fixup in the XenCenter 5.6 OVF Appliance Plug-in* for additional troubleshooting information.

Requirements

To run Operating System Fixups, you must have an ISO SR configured at the target XenServer or XenServer pool. If you do not have an ISO SR configured, you are prompted to configure and specify one.

Note:

XenServer does not support sharing a single ISO SR among many non-pooled XenServers. It is preferred that your XenServers are in a pool and the ISO SR is created to be used by all hosts in that pool. Importing a multi-VM OVF package into a group of non-pooled XenServers may result in failed import due to the Fixup ISO not being found on each XenServer. It is important to ensure that when using non-pooled XenServers, that each host has a configured ISO SR with a Fixup ISO in the ISO SR.

1. Create an NFS or CIFS (Windows) share from a file server host.
2. Have a user account that has read/write access to this share.
3. Create an ISO SR (using the user account and share from above) using the CLI or XenCenter.

Importing disk images

The Disk Image Import wizard lets you import a disk image into one of your resource pools or into a specific host as a VM. When you import the disk image, the wizard creates a VM for it.

You might want to use this wizard when only a virtual disk image is available, and there is no OVF metadata associated with it. Situations when this might occur include:

- Migrating content from a XenDesktop VMware hosting infrastructure to a XenDesktop XenServer hosting infrastructure.
- The OVF metadata is not readable. However, it is still possible to import the disk image.
- You have a virtual disk that is not defined in an OVF package.
- You are moving from a platform that does not let you create an OVF appliance (for example, older platforms or images).
- You want to import an older VMware appliance that does not have any OVF information.
- You want to import MS Virtual Server 2005 content into XenServer.

When available, Citrix recommends importing appliance packages that contain OVF metadata and not just importing an individual disk image. The OVF data provides information the wizard needs to reconstitute a

VM from its disk image, including the number of disk images associated with the VM, the processor, storage, network, and memory requirements and so on. Without this information, it can be much more complex and error-prone when trying to recreate the VM.

Importing disk images consists of two major tasks, which you perform with the XenServer Disk Image Import Wizard:

1. Selecting a disk image to import.
2. Enter information for XenCenter to use to create the VM after the image is imported (that is, "defining" the VM).

Note:

Running Fixups on disk images may or may not be required. It is impossible to account for every potential device driver or other component installed and required by the original hardware platform (virtual or bare metal). In some cases, Fixups may not be able to ensure the disk imported will successfully boot as a XenServer VM. See CTX124961, *Operating System Fixup in the XenCenter 5.6 OVF Appliance Plug-in* for additional information regarding Fixup, operating systems and disk import types.

To start the Disk Image Import wizard

1. In the XenCenter tree, right-click the host where you want to import the image and select **Disk Image Import**.
2. Continue selecting options in the appliance wizard. Additional information about the choices in each page is available by pressing F1 on a wizard page to invoke the online help.

Supported disk image formats

The Disk Image Import wizard supports importing the following formats:

- **Virtual Hard Disk (VHD)** is a universal virtual hard-disk file format that contains items similar to a physical hard drive, such as files, folders, and partitions. Often, VHD is used as the hard disk of a virtual machine.
- **Virtual Machine Disk (VMDK)**. The VMware virtual appliance file format for VMware products.
- **Virtual Disk Image (VDI)**. Sun's virtual appliance file format for VMware the Virtual Box product.
- **Windows Imaging Format (WIM)**. Microsoft's file-based disk image format used for its more recent operating systems (Windows 7, Windows Server 2008).

Tip:

If you are importing a WIM disk image, consider reading the following Citrix Knowledge Center article: *How to Build a Reference Virtual Machine for Deployment from WIM*. It is important to understand that the most recent Windows versions auto-detect hardware changes and do not need to run Fixups where as Windows Server 2003 and earlier do not have this capability. In these cases, you must know what type of disk controller the WIM has to know if Fixups are required. For WIM with IDE interfaces, Fixups should not be necessary. For WIM with SCSI interfaces, Fixups are required.

Troubleshooting the XenServer OVF Appliance Wizard

When exporting and importing appliances and disk images, errors can occur for a variety of reasons. Sometimes the wizard may fail to start or errors occur after completing the wizard due to file format

incompatibilities, host memory constraints, or ISO SR issues. Likewise, issues with the *TransferVM template*, a template specifically designed to facilitate importing and exporting VMs, may cause problems.

To check to see if the TransferVM template is installed

- In XenCenter, select **View > Hidden Objects**. Make sure a check mark appears beside the **Hidden Objects** menu item.

  If present, the template appears under the host in the XenCenter tree.

Wizard does not start

The following error appears: "Cannot start XenAppliance wizard, no valid session information provided."

If you receive this message, check the XenCenter log for more details and see the description of the entry in the table that follows:

XenCenter log entry	Suggestions
"iSCSI initialization failure. A connection attempt failed because the connected party did not properly respond after a period of time, or established connection failed because connected host has failed to respond."	Make sure DHCP is running on the network where the XenServer management interface is connected. The transfer mechanism used by the OVF Appliance Wizard is dependent upon obtaining an IP address through DHCP. If DHCP is not the issue, often trying to rerun the import or export wizards will generally result in success.
"TransferVM Missing."	The TransferVM is template only included in XenServer 5.6 and higher. If you have verified that you are running XenServer 5.6 or higher and the problem still persists, the TransferVM template may have been deleted. It can only be restored by re-installing the XenServer. The template cannot be installed on hosts not using local storage.

Errors after completing the wizard

The XenServer OVF Appliance Wizard writes most errors that occur during import to the XenCenter log. Consequently, the XenCenter log is a good place to begin troubleshooting.

The following errors may occur when exporting VMs and importing appliance packages or disk images:

Issue	Possible Causes	Corrective Action
OVF file is not understood	When this type of error appears, it can indicate that the wizard encountered something in the package that is non-compliant with the OVF standard.	If importing, consider importing the individual disk image files in the OVF package using the Disk Image Import wizard.

Issue	Possible Causes	Corrective Action
Press Cancel - doing clean up	If **Cancel** is pressed while importing an appliance package, the files created while attempting to import or export the appliance package are left in the destination folder (as debris) and need to be removed from the target XenServer. When **Cancel** is pressed, one of two things may occur: 1. A warning may appear stating that canceling the current operations may leave the targeted VMs unusable. In some situations, if you cancel an import, XenServer might not be able to return itself to a clean state and leaves the debris. If this occurs, the VM may be left in an unusable state. If you find a virtual disk image left over from a canceled import and attempt to use it, the virtual disk image will probably be incomplete and unusable. 2. If the import is canceled, XenServer attempts to clean up any debris remaining. This is done to leave XenServer in its pre-import state.	Delete the debris and attempt to reimport the package. If this fails, consider importing the individual disk image files in the OVF package using the Disk Image Import wizard.
Could not start Transfer VM	The TransferVM template may not be installed or may have been accidentally deleted.	Reinstall XenServer 5.6 or higher and ensure the target XenServer has local storage prior to installation.

Issue	Possible Causes	Corrective Action
No active sessions available	This error may occur for either of the following reasons: • There are no active sessions (that is, no VMs shutdown) available for export. • The TransferVM template is not installed on the host from which you are attempting to perform the action. The TransferVM template will not install unless the host has local storage.	Either shutdown the VMs you want to export or reinstall XenServer 5.6 or higher on the host, provided it has local storage.
Import Failures	• The ISO SR may not contain the Fixup ISO. This may be a problem with stand alone hosts that are not in a pool trying to share the same ISO SR. • XenServer does not support multiple un-pooled hosts sharing the same ISO SR and the Wizard will only select from the first ISO SR it finds. • An attempt to import a multi-VM OVF into two or more stand alone hosts that mount different ISO SRs.	Join hosts to a pool and mount an ISO SR. For standalone hosts that are not in a pool and that use a separate ISO SR, ensure each ISO SR has a copy of the Fixup ISO. Manually copy the Fixup ISO into the ISO SR if necessary.
WIM import blue screens with a STOP 0x0000007B Error	• The fixup process was enabled against a Windows XP or Windows Server 2003 WIM with an IDE controller. • The fixup process was not enabled against a Windows XP or Windows Server 2003 WIM with a SCSI controller.	Delete the imported VM, rerun Disk Import Wizard and clear the Run Fixups check box. Delete the imported VM, rerun Disk Import Wizard and check the Run Fixups check box.

Important:

Before attempting to reimport the appliance, delete any files created during the import from the folder containing the appliance package.

Errors when trying to start an imported VM

If you cannot boot the VMs in the appliance you imported, try reimporting the appliance and in the **Advanced import options** page, deselecting the Run Fixups check box (see the section called "Operating System Fixups"). This feature helps resolve minor issues in Microsoft Windows and Linux that cause issues when the VM is booting and may be the cause of the problem.

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Appendix A. Creating ISO images

XenServer can use ISO images of CD-ROM or DVD-ROM disks as installation media and data sources for Windows or Linux VMs. This section describes how to make ISO images from CD/DVD media.

Creating an ISO on a Linux computer

1. Put the CD- or DVD-ROM disk into the drive. The disk should not be mounted. To check, run the command:

   mount

   If the disk is mounted, unmount the disk. Refer to your operating system documentation for assistance if required.
2. As root, run the command

   ```
   dd if=/dev/cdrom of=/path/cdimg_filename.iso
   ```

   This will take some time. When the operation is completed successfully, you should see something like:

   ```
   1187972+0 records in
   1187972+0 records out
   ```

   Your ISO file is ready.

On a Windows computer

- Windows computers do not have an equivalent operating system command to create an ISO. Most CD-burning tools have a means of saving a CD as an ISO file.

  One simple and free utility is ISO Recorder. It works on Windows XP SP2/SP3, Windows 2000, and Windows Server 2003. Once installed, right-click on a CD/DVD drive and select **Create image from CD** from the context menu.

Appendix B. Setting Up a Red Hat Installation Server

This chapter explains how to set up a server as an installation server for Red Hat Linux.

For a server to act as a Red Hat Linux network installation server, you need space on your server to copy the entire contents of each CD onto your server. This is typically the number of CDs or ISO images multiplied by 650MB.

Ensure that the space you intend to use is formatted with your chosen filesystem and is mounted. You can check this space with the command:

df -h

Copying installation media

1. First create a directory to contain the installation files, for example `/install`
2. Mount your CD. Refer to your operating system documentation for assistance if needed. This example assumes that it is mounted at `/mnt/cdrom`:

   ```
   mount /mnt/cdrom
   ```
3. Copy the data from the CD to the installation directory:

   ```
   cp -var /mnt/cdrom/RedHat /install
   ```
4. Unmount the CD:

   ```
   umount /mnt/cdrom
   ```
5. Remove the first CD, put in the next one, and repeat for each of the CDs you have.

   Note:

   Copying the subsequent disks will overwrite some files, but these are generic files such as `license.txt` that appear on each CD, and this is not a problem.

Enable remote access

Next, make your installation data available to other machines on the network. You can use NFS, HTTP, or FTP protocols. You can enable all three services on your server or any subset of the three.

NFS

To install over NFS you must meet certain conditions on the server:

- The installation directory must be exported

  To export your installation directory, edit the `/etc/exports` file and add an entry for `/install` to it:

  ```
  /install *(ro)
  ```

  Save the edited exports file and make the NFS daemon reread its configuration file:

  ```
  exportfs -r
  ```

This configures the most basic read-only export to all hosts on our network. If you want to include more advanced options in your export, such as exporting to certain hosts only, or on a certain subnet only, see the man page for the exports file: `exports (5)`.

- NFS needs to be installed and running

  To check, type the command:

  ```
  showmount -e hostname
  ```

  Running the **showmount** command without the hostname parameter will check the local system.

  If NFS is not active, you will see a message similar to

  ```
  showmount: ServerA: RPC: Program not registered
  ```

- `portmap` must be running. Run the following command to check this:

  ```
  service portmap status
  ```

FTP

To enable installation over FTP, you must allow FTP access to the installation directory on the server. This can be either anonymous FTP access or access through a named account with a password.

If you want anonymous FTP to point to a different directory, you can use symlinks to point to the installation directory on the server.

HTTP

If you have a web server running and want to enable HTTP access to your installation server, add symlinks from your document root to the installation server directory to grant access.

The installation server is now ready to use. Record the server name or IP address and the directory path to the installation directory you created.

Appendix C. Troubleshooting VM problems

If you experience odd behavior, application crashes, or have other issues, this chapter is meant to help you solve the problem if possible and, failing that, describes where the application logs are located and other information that can help your XenServer Solution Provider and Citrix track and resolve the issue.

Troubleshooting of installation issues is covered in the *XenServer Installation Guide*. Troubleshooting of XenServer host issues is covered in the *XenServer Administrator's Guide*.

> Note:
>
> Citrix recommends that you follow the troubleshooting information in this chapter solely under the guidance of your XenServer Solution Provider or Citrix Support.

Citrix provides two forms of support: you can get free self-help support on the Support site, or you may purchase our Support Services and directly submit requests by filing an online Support Case. Our free web-based resources include product documentation, a Knowledge Base, and discussion forums.

VM crashes

If you are experiencing VM crashes, it is possible that a kernel crash dump can help identify the problem. If the crash is reproducible, follow this procedure to send the crash dumps to Citrix.

Controlling Linux VM Crashdump Behaviour

For Linux VMs, the crashdump behavior can be controlled through the *actions-after-crash* parameter. The following are the possible values:

Value	Description
preserve	leave the VM in a paused state (for analysis)
coredump_and_restart	record a core dump, then reboot the VM
coredump_and_destroy	record a core dump, leave VM halted
restart	no core dump, just reboot VM (this is the default)
destroy	no coredump, leave VM halted

To enable saving of Linux VM crash dumps

1. On the XenServer host, determine the UUID of the desired VM by running the command:

   ```
   xe vm-list name-label=<name> params=uuid --minimal
   ```

2. Change the *actions-after-crash* value using **xe vm-param-set**; for example:

   ```
   xe vm-param-set uuid=<vm_uuid> actions-after-crash=coredump_and_restart
   ```

Controlling Windows VM Crashdump Behaviour

For Windows VMs, the core dump behavior cannot be controlled by the *actions-after-crash* parameter. By default Windows crash dumps are put into `%SystemRoot%\Minidump` in the Windows VM itself.

You can configure the VMs dump level by following the menu path **My Computer > Properties > Advanced > Startup and Recovery**.

Troubleshooting boot problems on Linux VMs

There is a utility script named **xe-edit-bootloader** in the XenServer host control domain which can be used to edit the bootloader configuration of a shutdown Linux VM. This can be used to fix problems which are preventing it from booting.

To use this script:

1. Run the command

   ```
   xe vm-list
   ```

   to ensure that the VM in question is shut down (the value of *power-state* will be *halted*).
2. You can use the UUID as follows:

   ```
   xe-edit-bootloader -u <linux_vm_uuid> -p <partition_number>
   ```

   or the name-label as follows:

   ```
   xe-edit-bootloader -n <linux_vm_name_label> -p <partition_number>
   ```

   The partition number represents the slice of the disk which has the filesystem. In the case of the default Debian template, this is *1* since it is the first partition.
3. You will be dropped into an editor with the `grub.conf` file for the specified VM loaded. Make the changes to fix it, and save the file, exit the editor, and start the VM.

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